THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XVI. No. 384—19th YEAR.] LONDON, JULY 9, 1867. [Subscription per Ann. { 15s. in Advance / 18s. Credit.] With SUPPLEMENT, Price 1s. 6d.

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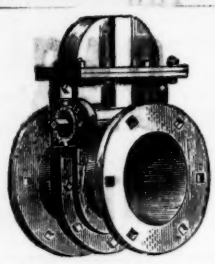

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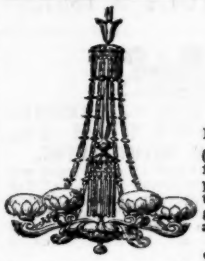

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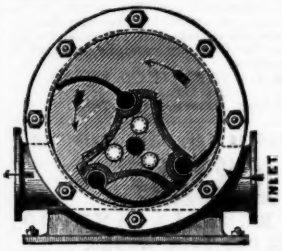

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

NOTICES.

The subscription is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders must be made payable at the Charing Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

The next number will be published on Tuesday, July 23, and the subsequent numbers on each successive alternate Tuesday.

Stamped copies, when forwarded by post, must be folded so as to expose the stamp; they are otherwise liable to the full postage charge for letters.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 9, 1867.

Notes upon Passing Events.

TRADES UNIONS, their sayings, their doings, their avowed and their actual objects, continue to be, and are likely long to be, the subjects of continuous discussion, because these are not abstract questions, like the franchise or women's voting capacity, but matters affecting the daily life of all of us. As to the Sheffield investigation, it will remain a striking example of the advantage of a system which relies for its strength on publicity and discussion rather than on a secret police and suppression of news. If the Sheffield crimes had been ferreted out by well-trained detective police spies like the French; if all reports had been forbidden; if the prisoners, when arrested, had been confined *au secret*, examined and cross-examined by a Government official, and thus badgered or entrapped into a confession, some of the assassins might have been convicted and hung; but nearly all the working classes, and many others, would have remained convinced that the instances of crime were exceptional, and that the most weighty charges were the concoction of Government spies. As it is, the public is well repaid for the escape of the trades union assassins and their hirers by the completeness of the revelations and the utter absence (out of Sheffield) of pity or sympathy for any of the criminals. The flood of light thrown upon this complicated system of trades union despotism—a system of theft, brutal assaults, and murders hidden by frauds and forgeries—has done more for the future improvement of public morality than a score of criminal convictions and executions. It is true that no dependence is to be placed on the indignant resolutions which the prime movers in trades union despotism are engaged in manufacturing and passing in different parts of the kingdom. In murder Sheffield took the lead, and with a few more years of impunity, would have created a very pretty school of trade regulators. The chiefs in active outrages kept their own counsel, and enabled every subscriber who paid for the various steps of coercion, from simple rattening to downright murder, to cry aloud, "Thou "canst not say I did it;" but this is quite certain, all the trades unions of Sheffield sympathized with the hired bullies and assassins, although some thought murder or blowing up a house "going a little too far." The investigation which has laid bare the hideous wickedness of Sheffield trades union despotism has checked the spread of this unhealthy public opinion,—that is, trades union opinion—and has also shown the bystanding world all over England what thin divisions separate intimidation and coercion from actual violence. In London the trades unionists have not gone so far. They are not such "advanced reformers" as at Sheffield. They are satisfied with making the life of the non-unionist "*black*," miserable, or at most punching his head. The leaders of the London trades unions—the Odgers, the Cremers, and the Potters—declare, with many solemn asseverations, that they do not approve of physical force, even in the mild form of head-punching, and that they desire to rely on moral force, assisted by the picket system alone. It may be so; but in the present aspect of affairs we may be permitted to doubt whether they disapprove of violent assaults except when found out and the cause of unpopularity. Shakespeare's Macbeth and King John had moments when they wished to disown their murdering tools, but King Henry meant something when he gave the hint that led to the slaughter of Thomas à Becket.

Of course no crime would be complete without apologists. A very amiable student, Mr. Morley, writes:—"Why should "we cease to wish well to the labouring classes in their "efforts to surround their lives with more comfort, security, "and regularity, simply because some of them resort to "murderous and hateful crimes in pursuance of their objects? "We did not withdraw our sympathy from Italy, because we "knew that there were connected with it numbers of bloody "and desperate fanatics." This is begging the whole question. We do not admit that the despotism which trades unions would like to establish by law, and which they do carry out by terrorism, will give "comfort, security, and regularity to the "lives of labouring men." We sympathized with Italy's struggles for freedom, because we believed that success would bring liberty, security for life and property, and progress in all the civilizing arts; and we do not sympathize with the secret views of trades unions, because we do not believe that their triumph by murder or *by law* would add to the welfare of the great mass of the community, including the working classes. Union to form benefit societies, to procure work, and even to agree when general instead of personal applications should be made to masters for a rise of wages, are what no impartial person can object to or fail to approve. Masters are not infallible or unselfish. The security for their best behaviour rests in their self-interest, and in their competition for the use of labour. But trades unions as they exist have no care for the community, no care for the labouring classes *outside* their special trades, when they throw obstacles in the way of apprenticeship, or of a clever labourer becoming a journeyman and mechanic, and this is one of the principal objects of trades unions. They not only tax the consumer, but they keep down in an inferior position as mere hewers of wood and drawers of water the children of men of their own class. The working people remain, undiminished in number, but union laws compel many to remain labourers, who, in America, for instance, become mechanics. It is mere clap-trap to refer to restrictions imposed on the callings of barristers and attorneys, for although many people have suffered from the want of carpenters, masons, and bricklayers, no village was ever yet in distress for want of a lawyer. Mr. Morley seems to think that whatever is numerous and powerful must be right—a strong argument in favour of the policy of any successful owner of armies—and he assumes that because the amalgamated carpenters, the amalgamated engineers, and the operative masons

increased in number enormously in 1866, therefore these associations must be founded on principles of justice and mutual advantage, and ridicules the idea that the members are under any species of terrorism. The fact is that at a time when capital could be obtained without stint, and masters were all competing with each other for men, societies, making use of the power of weekly subscriptions, secured an increase of income and accumulated funds that enabled them to offer great advantages to their members. To a carpenter they said, "You shall be provided for in sickness and when "out of work, and you shall be told where work is to be had." This was very tempting, especially as, on the other side, if you do not accept society men will not work with you—they will strike against you; or, if they do, you shall be alone in the shop, sent to Coventry, insulted, worried, and tormented. As long as work was plentiful, there was no doubt about the advantage of being a unionist. But when work grew slack, and could be had at 7d. or 7½d. an hour instead of 8d., then the inconvenience of having to take orders from a central committee was felt in many a working man's home. When all the co-operative advantages of a trades union are admitted —indeed, they cannot be denied—there remains the disadvantage of a system under which two people who know their own business cannot settle their own bargains. The result is that masters in great workshops can only afford to employ the very best workmen when they have to pay all alike. Mr. Morley quotes from the manifesto of American protectionists a statement—"England has degraded labour to very low "wages; too low for families to maintain themselves properly "and comfortably"—as if the statement were true. It is notoriously false. The low wages of England exist in pursuits where union is impossible—in agricultural labour and in unskilled labour. In all the British manufactures which the American tariff is framed to keep out, the wages are excellent, and, according to an American calculation, give more comfort than the nominal wages of America. The most successful trades unions have never had low wages; the most successful, the engineers, have contrived so well that they have nearly driven the iron ship trade from the Thames, and raised up rival manufacturers for steam-engines in France and Germany, where cheaper labour tells on produce, two-thirds of the cost of which is labour. Time, no doubt, will bring all right, and teach our skilled workmen that wages, like all other prices, must be limited by profits. All the pumping machinery in the world will not get water out of a dry well, and the trade unions regulation will not keep in existence a race of employers unless there is a profit to be earned. As to the despotism which some desk philosophers extenuate, let us imagine what our Odgers and Cremers would say to a Polish workman who, dismissed by his Russian master, was never left alone—dogged from place to place by spies, all masters warned from employing him, all places of refreshment made unpleasant, with the occasional interlude of bonneting, kicks, and black eyes from police in the master's employment. Despotism is not less despotism and cruelty because it is ordered by a committee and not a king, and executed by a workman and not by a policeman. If philosophers of Mr. Morley's school want to put down competition they must establish successful co-operation.

No one whose opinion or influence is of any value objects to co-operative societies for manufacturing, working, or retailing, because all that the public requires is to be served well, and at a moderate price, whether it be calico or a suit of clothes, a house to be built, or a ship, or a stock of groceries to be laid in; and a co-operative society of builders, or tailors, or storekeepers, would be received without any prejudice, if they furnished a good article at a fraction cheaper than ordinary tradesmen. But men of business know that co-operative societies will generally work at the same disadvantage that companies work against individuals or small partnerships. Zeal in bargains, close economy, rapid decision, and the power of making a temporary sacrifice for a future gain, are usually wanting in companies management, whether ordinary or co-operative. For these reasons men of business do not believe that the really valuable principle of co-operation will ever materially affect the standard trades and manufactures of the country, although co-operative societies may afford, under favourable circumstances, a good investment for the savings of working men in great towns and centres of manufactures. But the political objects of trades unions, as represented by its more able members, are to re-establish guilds of trade for the benefit of the working man, on the principle of a war against capital. When the bricklayers restrict the number of bricks a man may lay in a day, they act on the principle that protests against the use of machinery. They desire to make as much work as possible. This is home protection; the advance to protection against foreign importations is but a step. Our old external protectionist manufacturers always spoke in the name of the workman and his wages, as the American manufacturers do now. Admit, then, that the trades unionists are right in endeavouring to create an artificial scarcity of labour, and the doctrine of protection against foreign manufactures must follow, as it has in Australia. As for Professor Beesley, he is not a mild and innocent enthusiast, like Mr. Morley, the student and author, but simply one of those vain men who find in "palavering" working men a degree of importance they have not been able to attain in any other society. In Professor Beesley it is to be hoped that we do not see a specimen of the future government of professors promised us, when the power of rank and wealth has passed away, and pure *geist* reigns.

In the course of a week the Royal Agricultural Society opens its great summer show, after a blank of a year, caused by the cattle plague, and this year the cattle plague will deprive the show at Bury of one of its greatest attractions, for no cattle will be exhibited. But this blank year has not been altogether time lost, for it has caused the council of the society to turn its attention to some other means of proving its utility, and attracting the attention of that part of the public by whose subscriptions the society is supported. One most important step adopted was a systematic survey of the progress of steam cultivation. This was carried out with a completeness not common in the operations of *dilettanti* societies. Three Inspection Committees were appointed, consisting of eminent farmers, to each of which a professional agricultural writer was attached as reporter. These committees followed in the tracks prepared by circulars addressed to the owners of steam farms, with a schedule of questions. Committee No. 1 visited steam cultivated farms in Norfolk, Suffolk, Cambridgeshire, Huntingdonshire, Hertfordshire, Essex, Surrey, Kent, Sussex, and Hampshire. Committee No. 2, Northumberland, York, Lincoln, Nottingham, Stafford, Salop, Flint, Montgomery, Worcester, Warwick, Gloucester, Somerset, Dorset, Wilts, Berks, Oxford, Bucks, Bedford, and Northampton. Committee No. 3, Yorkshire, Durham, Cumberland, Westmoreland, Lancashire, Shropshire, Staffordshire, Nottinghamshire, and Leicestershire. The three visiting altogether 135 farms where steam cultivation had been or was employed. These reports, from the thoroughly practical character of the men who composed the committee, are very different from the ordinary gossip of agricultural newspaper articles, or the after-dinner speeches of amateur agriculturists bent on astonishing their hearers. The limit of agricultural improvement is very estimated, because the best that cultivation, with the most scientific appliances, can do is to produce as good an article as that grown without any science, and the least possible trouble, on a fertile soil under a favourable climate. The triumphs of machinery in the fabrication of, say, textiles, are not to be rivalled by all that mechanical skill and chemical discoveries can do for agriculture. The progress of steam cultivation has been comparatively rapid, for ten years ago the possibility of profitably applying steam power to the cultivation of the soil was still a matter of doubt amongst the most advanced agricultural authorities. There is now no doubt that under ordinary circumstances, on a farm of 300 acres and over, the investment of capital in steam cultivating apparatus will pay. Mr. H. Reed, reporting for No. 1 committee, "says: Upon medium and heavy soils the benefits obtained are "undeniable. A culture deeper than it is possible for horses to "effect works a highly beneficial change in the texture of the "soil, imparts additional efficiency to drainage works, aug-"ments the value of manure applied, brings into operation "certain latent properties of the soil which much increase its "fertility, fits land formerly unfit for the growth of turnips, "allows of their being fed off by sheep, the operations of the "field are economized, and the growth of all crops stimu-"lated." . . . "Operations are better done, quicker "done, less expensively, and all kindred movements have had "a speed characteristic of steam imparted to them. Men "acquire the habit of doing the day's work in the day, and "not leaving it for the morrow; the day's labour, too, on a "steam farm represents more work, with less distress to the "labourer and better remuneration." Mr. Algernon Clarke, reporting for No. 2 committee, amongst other points, concludes "that the saving of time is more important than the

"saving of cost of cultivation; that steam cultivation, in most "cases, gives an increase of produce, in some instances as "much as eight bushels per acre; that steam tackle, whether "of Fowler, Howard, Smith, or other makers, is now so far "perfected and settled in form and details that it may be "classed among old-established standard farm machinery, and "not among novelties." As a general conclusion, "steam culti- "vation has, in the main, answered well, and here and there, "where anybody has tried it and given it up, we are quite "sure, from the success of so many men in all parts of the "country, there must be explanation of the fact either in the "fault of the manager or in the inefficiency of those particular "pieces of machinery, not affecting the credit of steam tillage "at all." Mr. Clarke truly observes that "steam culture is "to a large extent a landlords question. An engine cannot "profitably traverse the clay lanes that exist on many estates, "and the tenant cannot make sound hard roads at his own "expense. An engine cannot work with good profits in "diminutive polygonal inclosures, and the tenant cannot clear "away at his own expense mile after mile of straggling "hedges and primeval copses. Steam tillage is obstructed "and machinery damaged by outstanding field timber and by "excessive hedgerow timber. Where tenants are forbidden "the use of a reaping-machine, or limited to stubble of a "certain number of inches height, or if allowed to mow are "forbidden to rake after, it is simply impossible for steam "tillage to be resorted to at all, the very backbone of which "is the earliest upturning of stubbles and deep, light winter "tilths." Mr. Coleman, the third reporter, who was formerly Professor of Agriculture at the Cirencester Agricultural College, considers "that where farms are small—the arable "land under 300 acres—the land hilly, and the fields irre- "gular, the roundabout system is the most practical and "economical. Where the land is level, the fields large, and "we have an area sufficient to employ the machinery for 100 "days in the year, direct traction offers greater advantages "especially in strong land, provided there are roads to move "on." This is enough for those to whom the subject is vague and new. The full reports will be found in the last number of the Journal of the Royal Agricultural Society.

The select committee of the House of Commons who were instructed "to inquire into the operation and results of the "Metropolis Water Act of 1852," have made a very important report, which is likely to be the key-note of future legislation on the subject. We are not able, in these "Notes," to enter as fully as we must shortly do into the contents of this very important document. It should be considered with the paper read by Mr. Bailey Denton, at the Society of Arts, on the storeage of the surplus waters of the Upper Thames, which we shall shortly reprint. Mr. Denton having done as much, if not more than any other man to relieve agricultural land of superfluous water, has now turned his attention to schemes for laying by in reservoirs the floods which are much wanted in time of drought. The theory seems sound, but the plan for carrying it out will require a good deal of consideration. The report gives a brief history of the water companies which supplies London since 1821, when a committee of the House was appointed to inquire into the whole subject of the supply of the metropolis, which reported, but did not initiate any general legislation. After tracing the progress of legislation and improvement in quantity and quality of supply, the committee proceed to make suggestions for still further increasing the supply and improving the quality, and conclude with recommending, in considerable detail, the enforcement of the constant supply system. Into all these points we propose to enter in our next "Notes."

THE LAND DRAINAGE ACT, 1861.

Although this Act has been brought into operation in some portions of the kingdom, it is believed that in many other parts its existence is not known, or the powers conferred by it are not properly understood and appreciated. The object to be attained by the Act is, to enable the owners of lands situated in districts subject to inundations by floods—such as marsh lands in valleys of rivers—to combine and form either a Commission of Sewers or an Elective Drainage Board, for the purpose of carrying out a connected system of drainage, with powers to tax the lands thereby improved with the cost of the works in proportion to the benefit conferred. These drainage areas are formed under the sanction of the Inclosure Commissioners, who settle the boundaries of the jurisdiction of the Commission of Sewers or Elective Drainage Board, as the case may be, nominate the members, and fix their numbers and qualifications. There have been already 20 districts formed, comprising about 65,000 acres, in the counties of Brecon, Cheshire, Gloucester, Hereford, Merioneth, Norfolk, Northampton, Nottingham, Oxford, Somerset, Worcester, and York. Most of the drainage works proposed in connexion with these districts have been carried out, but the full effects in many of the cases have not been completely developed, though other cases have resulted in a perfect reclamation of land that was previously of scarcely any value, but which has now been brought into cultivation, and is capable of paying rent, and the charge for the improvement.

The mode of proceeding to apply the powers of the Act is both simple and inexpensive. The promoters memorialize the Inclosure Commissioners, and deposit a sum of money to meet their expenses, upon which an inspector is sent to the locality, having first published in the neighbourhood notices of his intention of holding a public meeting, and inspecting the boundaries. Upon receiving his report the Inclosure Commissioners, if they approve of the district being constituted, issue (if the case is under part 2 of the Act) a provisional order for its formation; if it is to be under the first part of the Act they report to a Secretary of State, and a Commission of Sewers is issued.

The expense of procuring the power of the Act by either of these methods has been under £50 in all the cases authorized. The areas of the districts varied from about 600 acres to upwards of 11,000 acres. In all those cases which are completed, the rates have varied from 4s. to 10s. per acre, and in each particular case the rate may vary as much or more upon the several lands in proportion as they have derived benefit, the improved value forming the basis of the rate.

The method adopted in fixing the rates charged in the general drainage of Ireland in 1847-48 is probably the best and most equitable for arriving at a fair value, and this was done by valuing the lands previously to any works being commenced. In many cases they had been almost constantly under water for years, or were marshes, and utterly useless and wasteful. They were again valued after the completion of the works had effected an improvement, by rendering them dry and secure from floods, and the difference arising from the improvement became the rateable value. In many parts of England, particularly where Acts of Parliament, Improvement Commissioners, or Commissions of Sewers, have established drainage areas, different modes of rating are adopted, and in many cases without any fixed principle; and while the rate is low no great complaint is made, though it is but seldom that any good arises from the work.

The true principle in rating is certainly to charge the lands in proportion to the benefit conferred in the simplest manner. When the Sewers Laws were first instituted (23 Henry VIII., cap. 5), no distinction was made between town and agricultural drainage, and for a long time afterwards—in fact, down to within a few years of the present period—the same general laws, particularly in regard to rating, were adopted for both; but, now that the towns have an established legislative system, there is required an equally well defined and distinct system for agricultural districts. It has been proposed, therefore, to consolidate all the Sewers Laws, and amend the Land Drainage Act, 1861, so as to simplify the law, and render it more available for all agricultural requirements.

Circular to Gas Companies.

The committee on the Metropolis Gas Act Amendment Bill have sat only four days since our last, and the time was almost entirely occupied with the speeches of counsel. On the fourth day the committee unanimously agreed to certain resolutions, indicating their opinions on the general state of the inquiry, and throwing out suggestions for propositions to be made by the gas companies; after which the proceedings were adjourned to this day, to allow the companies time to consider their position. What that position is we shall presently examine, but we must preface our remarks with a brief sketch of the line of argument adopted by the counsel.

Mr. Hope Scott commenced to sum up the case on behalf of the gas companies on the 25th ult., and he did not conclude his speech until the following day. He began by stating the condition of the thirteen metropolis gas companies before

the passing of the Act of 1860, with the view of showing, as had been requested by the chairman, what were the rights which they considered were given to them by that Act. He pointed out that the districting arrangements had been previously agreed to by the companies; that the result had proved beneficial to the public, while it had been greatly to the advantage of the gas companies; and that the confirmation of that arrangement by Parliament was the only direct benefit which the companies had derived from the Act. The regulations imposed on them as the condition of being secured in the monopoly were at the same time numerous, and all tending to the advantage of the consumers of gas. The Act was, as Mr. Hope Scott stated, avowedly a compromise, by which the companies were secured in their existing rights on making concessions as to the price, illuminating power, and purity of the gas, and the conditions of supply; and they had a right to expect in return undisputed possession of their property, and that they should not be subjected to the annoyance and to the injury of their property caused by continued agitation. That expectation had, however, been disappointed, and he considered the encouragement given to agitation by the appointment of the committee of inquiry last session, and the consideration of the Corporation of London Gas Bill, as breaches of the settlement of the Act of 1860, with the provisions of which the companies had strictly complied. Mr. Hope Scott commented severely on the report of that committee, observing that it was not borne out by the evidence, and he set forth the offer then made by the gas companies to raise the illuminating power to 14 candles, and to reduce the maximum price to 4s. per 1000 feet, which, on their behalf, he repeated. He then proceeded to animadvert on the circumstances which gave rise to the Metropolis Gas Act Amendment Bill referred to the present committee, and to the correspondence between the Board of Trade, the Corporation of London, the Metropolitan Board of Works, and the gas companies, and to the understanding on which the latter consented not to oppose the second reading of the Bill. He said the Bill passed its second reading on the distinct understanding that the prescribed 10 per cent. dividends on the existing capitals of the companies should be retained, and that they held the Government pledged not to proceed with the measure if it should assume a form which violated that compact. Proceeding then to consider the question of the various amounts of capital and the different conditions of the metropolitan gas companies, Mr. Hope Scott pointed out that the capital of the PHŒNIX Company amounted to £8 11s. 5d. per ton of coal carbonized, while the capital of the INDEPENDENT Company did not exceed £4 0s. 8d. per ton; that nearly equal differences existed in other companies, provincial as well as metropolitan, and that it was idle, therefore, to talk of that question as having anything to do with the present inquiry. He said that if the committee intended to respect property, they must take care that the dividend attached to the capitals of the companies by Parliament should not be interfered with by Parliament itself, which it would be if a higher rate of illuminating power were fixed with a limitation of price by which it would be impossible to pay the authorized dividend. Mr. Michael, on behalf of the WESTERN Company, then addressed the committee, and occupied the remainder of the sitting. He contended, on a review of the evidence relating to the manufacture of cannel gas, that so far from showing the price should be reduced it tended rather to prove that it should be increased. The committee, at the conclusion of the speeches for the gas companies, adjourned to the following Tuesday. On that day Mr. O'Malley, on behalf of the gas consumers, commented on the evidence which had been adduced by the companies, considering in the first place the cost at which 18-candle gas can be produced. With a degree of assurance seldom equalled, even by an advocate, he took for granted the correctness of statements on one side which had been positively contradicted by the other, and adopted as facts assertions which were well known to be false. Founding his arguments on those bases, he attempted to show that the cost of the production of 1000 feet of 18-candle gas, reckoning leakage, was only 1s. 6d. With respect to the capitals of the companies, he affirmed that they had been improvidently increased by reckless competition, for which neither Parliament nor the public were to blame; that the more money they wasted then the richer they are at present, by paying high dividends on the money thrown away, and now reckoned as capital; and that their capitals, representing works that are productive to the public, would not amount to above 4 millions sterling. He affirmed that the Act of 1860 did not deal with the question of maximum dividend, though he had stated immediately before that it incorporated the Gas-Works Clauses Act of 1847, by which the dividends were limited to 10 per cent. Mr. O'Malley reiterated the falsehood, that immediately after the passing of the Act of 1860 all the metropolitan gas companies raised the price of gas from 4s. to 4s. 6d. per 1000 feet, though it is perfectly well known that the Imperial Company made no advance, but continued to supply gas at the same rate as previous to the passing of the Act. The expenses of the management of the thirteen metropolitan gas companies, and the absence of stimulus to be economical when the maximum dividend was reached, were then commented on, and Mr. O'Malley concluded his speech, which occupied more than one whole sitting, by contending that under proper management and proper regulation, and with a fair distribution of capital, the companies could, even leaving their nominal capital untouched, realize in a short time the full 10 per cent., by supplying 18-candle gas at 3s. 6d. per 1000 feet. Mr. Davison, who appeared before the committee as the representative of the Board of Trade, fully admitted that it was a condition of the reference of the Bill to the committee that the maximum dividend of 10 per cent. should not be interfered with; and on being pressed by the chairman to state distinctly how far he considered the committee could deal with the Bill without violating that condition, Mr. Davison said it was the opinion of the Board of Trade that they were bound not to proceed with the Bill unless such a price and such an illuminating power be fixed as would in the judgment of the committee enable the companies to earn the maximum of 10 per cent.; and, further, that there was no intention on the part of the Board of Trade to interfere with the authorized capitals of the companies in any way whatever. After that explicit statement of the intentions of the official promoters of the Bill, the committee conferred together for some time, and unanimously adopted the following resolutions:—

1. That the supply of gas in London ought to be controlled in favour of the consumer, either by the means of an effective competition, or, if the system of an exclusive supply be maintained, by the means of effective regulation.
2. That neither of these conditions is adequately fulfilled by the system of exclusive supply now in operation under the arrangement sanctioned by the Act of 1860.
3. That no Bills for the establishment of a competing supply having been referred to the committee, the question of providing for the establishment of control by the means of competition does not immediately arise.
4. That the committee regard the establishment of a due control, by an amendment of the Act of 1860, upon the system of exclusive supply, as preferable to the future introduction of competing works, and are prepared to settle the present Bill accordingly, if that course be consented to by the parties.
5. That the extensive powers asked for by the Chartered Company and by the Imperial Company respectively, in the Bills now before the committee, are calculated to throw obstacles in the way of future competition, and that the committee are not prepared to entertain them until the general system of supply shall have been first placed upon a more satisfactory basis.
6. That the settlement must provide for the improved administration of the system by reduced expenditure; and the committee think that, by the amalgamation of some of the companies, and improved arrangements of the districts, that object may be easily attained.

It will be observed that the first four resolutions are merely declaratory of the opinions of the committee that the Act of 1860 requires amendment, and that an effective competition is one of the means by which the supply of gas in London ought to be controlled, though preferring effective regulation. The sixth resolution is the only one that affects the general inquiry, and even that touches on points that were not raised directly in the course of the evidence. Mr. Hope Scott endeavoured to obtain from the chairman a more explicit expression of the views of the committee regarding the principle on which the amalgamation of some of the companies, and the improved arrangement of the districts, should proceed; but the chairman threw the mode of amalgamation on the companies, observing that its proposed object was the reduction of expenditure, and that it was for the companies in the first place to consider what may be the mode most convenient among themselves by which the working expenditure may be reduced. He observed, in a very pointed manner, that if the parties gave the committee no assistance they should not pass any one of the three Bills, but report their opinion on the general subject to Parliament. The chairman, at the same time, made the important statement that the committee had decided that they shall not, in the absence of consent, proceed by hostile legislation to touch prices or capitals already sanctioned by Parliament.

We fully acknowledge the impartiality and patience exhibited

by the committee during the inquiry, and especially the remarkable acuteness and admirable lucidity of the chairman, but we think too much stress was laid by them on the probable reduction of expenditure by the amalgamation of some of the companies, and by an improved arrangement of the districts. The idea of concentrating the manufacture of gas in one locality seems to have been abandoned, and the main object sought to be obtained by the real promoters of the Bill—viz., the confiscation of the capitals of the companies, either directly by reducing their amounts, or indirectly by fixing the price of gas at less than is required to pay their respective parliamentary dividends—appears to have signally failed, as might be anticipated so long as the rights of property continue to be respected by our legislative bodies. Mr. Beal, Mr. Flintoff, and Mr. Dresser Rogers, will not derive much satisfaction from such a result of their labours; nor are they likely to receive adequate return for any money their principals may have expended in the furtherance of their agitation for cheap gas. Neither are the gas companies much pleased with the pressure thus suddenly brought to bear upon them to amalgamate, though such a proposition has been submitted to them again and again. It is now upwards of eighteen years since the amalgamation of the whole of the metropolitan gas companies was originally suggested in the very first number of this JOURNAL, and it was renewed in 1859 by Mr. Barlow, in a letter addressed to Sir George Cornewall Lewis, then the Home Secretary. But the suggestion did not meet with the approbation of the companies, and it was violently opposed by Mr. Hughes and the delegates from the metropolitan vestries, who probably foresaw that by its adoption their trade of agitation would be ended. Some of Mr. Barlow's suggestions are not now applicable to the changed circumstances since 1859, but they contain the germs of an amended scheme suited to the present condition of the gas supply of London; and if any substantial saving in working expenses is to be effected, there is no question that a general amalgamation, under proper control, is the most certain means by which it can be obtained. No small advantage of such a scheme would be uniformity of price, for great dissatisfaction is now frequently occasioned by the charge of different prices in adjoining districts, though the circumstances of the manufacture and supply of gas are in all respects the same. It is understood, however, that the pressure to which the companies have been subjected by the resolutions of the committee and by the opinions subsequently expressed by the chairman has not been sufficient to induce them to concur in a scheme of general amalgamation, but that to meet the wishes of the committee it will be proposed to condense the thirteen existing companies into four; three for lighting the districts north of the Thames, and one for lighting the districts south of the river. There can be no districting difficulty in the amalgamation of the companies south of the Thames by uniting the South Metropolitan and Surrey Consumers Companies with the Phœnix Company, and the retirement of the London Company from the Battersea district. The amalgamation of the companies north of the Thames into three would be extremely difficult, but we conceive that if they were amalgamated into two only, the division of their respective districts might be easily effected. A central metropolitan district might be formed by the amalgamation of the City, the London, the Equitable, the Great Central, and the Ratcliff Companies with the Chartered Company, and the retirement of the Western Company from their St. James's district; and the amalgamation of the Commercial, the Western, and Independent companies with the Imperial Company, and the retirement of the London Company from Fulham, west of the Fulham Creek, would form a North London district. By that arrangement all parts of the metropolis near the north bank of the river, from Chelsea to Shadwell, extending northwards as far as Oxford Street, Holborn, the City Road, the whole of Bishopsgate Street, and comprising the most densely occupied portions of the metropolis, would be included within the central district, and the remaining more extensive portions of the metropolis would be included in the North London district. By such a combination the works and mains of each of the existing companies could be used advantageously by the proposed amalgamated companies, and in many of the works the surplus manufacturing power could be applied to supply the deficiency of others, and thus prevent, for some time to come, the further expenditure of capital. To carry out that or any other extensive arrangement for amalgamation, ample time must be allowed for the publication of the "banns of marriage," as Mr. Hope Scott happily expressed it, and for the settlement of the marriage contracts between the parties, which will require full consideration; and in the meantime all legislative action on the matter must necessarily be suspended. The following table shows the paid-up share capitals and borrowed moneys, the gas-rentals, and the quantities of gas sold by each of the companies (grouped as we suggest) on the 31st of December last:—

	Capital.	Gas-Rental.	Gas Sold, in Cubic Feet.
Chartered	£810,000	£254,927	1,204,228,000
Equitable	300,000	76,185	365,653,000
London	725,631	154,425	742,663,000
City of London	453,388	106,388	527,404,751
Great Central	266,000	78,049	389,443,800
Ratcliff	114,000	32,686	145,128,000
	£2,669,019	£702,660	3,374,520,551
Commercial	£437,720	£125,821	628,364,000
Imperial	1,814,755	482,803	2,380,521,000
Western	345,460	94,911	338,288,000
Independent	205,500	66,973	380,496,000
	£2,803,435	£770,508	3,727,669,000
Phœnix	£888,620	£171,040	839,088,000
Sth. Metropolitan	228,821	69,977	417,908,000
Surrey Consumers	245,643	59,761	294,332,000
	£1,363,084	£300,778	1,551,328,000

The suggestion that competition in gas is still practicable may act as an encouragement to the formation of bubble companies of the Aldrington, Hove, and Brighton type, but can only be intended as a *brutum fulmen* unworthy of a place in any serious project for the settlement of the system on which the future supply of the metropolis with gas is to be effected.

The committee on the Metropolis Subway Bill have sat during six days since our last, and have examined a great number of witnesses. The case of the promoters of the Bill was closed—with the exception of the examination of Dr. Percy—on the 28th ult., and the evidence adduced in support of it was far from being satisfactory. The principal point endeavoured to be established was, that gas-pipes may be laid in subways without danger; but all the witnesses, except three taken from the camp of the gas companies, admitted that there was a possibility and even a probability of occasional explosions. Even in the report on the subways of Paris, signed by Mr. Bazalgette, Mr. Bramwell, Mr. Hemans, and Mr. Boulnois, who were called as witnesses in support of the Bill, they say: "Explosions will probably never be wholly avoided; "but as they frequently occur now where subways are not at "all in question, we do not think their occurrence is likely to "be increased by the introduction of pipes carefully laid and "watched in large and well-ventilated subways." That united opinion of the four engineers employed by the Metropolitan Board of Works is certainly not calculated to inspire confidence in those who may reside in streets undermined by galleries, which at any moment may be filled with an explosive mixture of hydrogen gas and atmospheric air. Mr. F. J. Evans, engineer of the Chartered Company, came to the rescue of the project, and boldly declared that there would be less danger of explosions from an escape of gas in subways than from mains in the streets, and if an explosion did occur in a subway its effects would be confined to the underground passages, and that a subway could not be blown up. He founded that opinion on experiments made with explosive mixtures of gas in a box. He further asserted that there would be little difficulty in ventilating subways, because on one occasion he allowed the gas to escape from a burner in his dining-room for a whole evening without perceiving any smell of gas, which he said was completely conducted away by an Arnott ventilator! Mr. Upward, of the Chartered Company, exhibited his patent drill, by means of which he said the mains in subways might be tapped without any escape of gas, and he expressed a favourable opinion on the use of subways. Mr. Jones, of the Commercial Company, also gave evidence in support of the Bill, stating that he considered there was no risk of explosion in subways. Several witnesses, indeed, affirmed that there was little danger to be apprehended from the escape of gas in subways; nevertheless there was a good deal of evidence adduced to prove that the operations of connecting service-pipes and jointing mains could be carried on without the employment of artificial light, by which the escaped gas could explode. Considerable stress was even laid on the heat of the molten lead to be used, it being assumed

that if the lead were not red hot the gas could not explode. This is a somewhat dangerous fallacy, as a very simple experiment will prove. A poker heated below redness will not ignite a jet of gas, but if dust be thrown upon the heated metal, the minute flames or sparks, caused by the ignition of some of the inflammable particles, will light the gas. In this manner explosions have been caused at a great distance from the fire used to melt the lead. Before the committee assembled on the 28th ult., they paid a visit of inspection to the subways in Southwark Street and Garrick Street. Mr. Denison, the counsel for the opponents of the Bill, reserved his speech till the conclusion of the evidence, and proceeded to call his witnesses. Mr. T. E. Foster, the eminent mining engineer of Newcastle-upon-Tyne, speaking from the experience of half a century, directly contradicted the inference drawn by Mr. Evans from his box experiment. He said that if a quantity of gas were to escape in a subway, and to explode, "it would blow up the arch in the street and kill "people, and destroy property." M. Belgrand, inspector-general of the Ponts et Chaussées in Paris, described the effects of the explosion of gas in the subways of Paris, especially at the Pont d'Austerlitz, and stated that a strong opinion is entertained by the engineers in Paris of the danger of laying gas-mains in underground passages. Mr. Bateman was called to prove that even for water-mains the laying them in subways would be very inconvenient and costly. Mr. Hawksley expressed the same opinion, and also gave evidence respecting the danger of laying gas-mains in subways, which plan would involve the necessity of employing an underground police, to prevent thieves from breaking through into the neighbouring houses, and to protect the mains and service-pipes from wanton damage. He said that at Nottingham, where a subway was constructed for a short distance, the workmen refused to enter it, as they were apprehensive of explosion. Several other witnesses, including Mr. Innes, of the Phœnix Company, and Mr. Brothers, of the Equitable, were called to confirm the statements of the other witness as to the danger of laying gas-mains in underground galleries. On Thursday, Dr. Percy, who was not able to attend before, gave evidence in support of the Bill, and suggested that an experiment should be tried by tapping a gas-pipe in a subway and then ascertaining, by means of Dr. Ancell's indicator, the quantity of gas that was diffused in a given time in different parts of the subway. Though he conceived there would be no danger in the experiment, he nevertheless recommended that safety-lamps should be used. This suggestion was adopted by the committee, and they adjourned to this day to allow time for the experiment.

There is yet a prospect of a compromise between the Cheltenham Improvement Commissioners and the gas company of that town. The latter have—wisely or unwisely, we will not say — consented to supply the public lamps with 13-candle gas at the price of 3s. per 1000 cubic feet, and they have adopted, with some modifications, the other requirements of the commissioners. The offer of the gas company was read at the ordinary meeting of the Board on Monday last, when it was referred to the Gas Committee, whose report on the subject was to be presented at a special meeting yesterday. It can scarcely be supposed that the commissioners will reject so conciliatory a proposal; but, at all events, the inhabitants generally ought to be consulted before carrying into effect a resolution for constructing gas-works, passed only by a small majority of the board, which would involve a large, if not wasteful, expenditure of the ratepayers money.

The proceedings of the gas agitators at Brighton afford a good illustration of the difficulty of satisfying such persons by any concessions. A public meeting was held there on Monday, for the purpose of inducing the gas consumers to prevent the Aldrington, Hove, and Brighton Gas Company from becoming altogether extinct, as the terms on which the existing companies supply gas are not so favourable as they might be. The supply of 14-candle gas for 3s. 6d. per 1000 feet is found to yield a profit of 3¼ per cent., therefore it is presumed they might charge less, or at least give a guarantee that under no change of circumstances would they charge more. A saving of £20,000 per annum is said to have been effected by the reduction to the present prices, and if competition could be established by infusing life into the new company, the consumers, it is said, would reap further advantages. Mr. Woollett, the chief speaker at the meeting, set forth the great benefits derived from Corporation management, which he should prefer to the establishment of the new company; but as the latter had obtained parliamentary powers he thought it advisable to support them, especially as there was a rumour that the Hove and Brighton Company intend to apply to Parliament for power to raise the price of their gas. It will be time for Mr. Woollett to make that the ground of an appeal on behalf of the Aldrington Company when he has any foundation for the assertion; and in the meantime the Brighton public will do well to keep their money in their pockets.

Mr. F. A. Taunton, ex-meter inspector for the Corporation of London, and for the Corporation of Kingston-upon-Thames, has hit upon a new device for bringing grist to his mill. Having been prevented from exercising his trade of stamping meters in London with the official seal of Kingston, he has made arrangements for testing and stamping meters unofficially, wherever they may be manufactured. He vaunts his superior qualifications as tester of meters, for "he is the only person in "this country who has the required instruments;" and he asserts that many thousand meters have been stamped in the metropolis as correct which he had previously rejected, and for which he might have received the fees if his feeling of duty had not been above the temptation of interest. The public are cautioned by his circular that no meter should be used unless it has his seal affixed, with the impress "accurately tested by "F. T., English meter examiner." For the further advantage of the public, he undertakes to supply them with meters at wholesale prices, and to supervise meters that are fixed, to prevent any fraud in the estimated registration. Among other recommendations of Mr. Taunton, he puts forth that he undertakes the whole duty of testing the meters himself; but if the pretensions of his circular be realized, he will be so overwhelmed with applications, that the labours of Hercules would be insignificant in comparison with his exertions to benefit the consumers of gas.

Correspondence.

GAS LEAKAGE.

SIR,—Would you kindly allow me to make some observations, in your valuable JOURNAL, on the important subject of gas leakage, which I refrained from making at the annual gathering of the British Association of Gas Managers, owing to the time being too limited even for the reading of the papers. In order to prevent some of the leakage that arises from the main and service pipes, advice was at the meeting given to test all the joints after they have been made. My advice with regard to lead joints is, to make perfect joints with the yarn only, and to prove them with the maximum pressure before running in the lead. This is my practice. I use well-tarred gaskets for the purpose.

With respect to wrought-iron service-pipes, a mistake is in many places made by not taking off all the sockets, and putting them on again with white lead before laying. Some of the service leakage arises from not adopting this plan, especially where the services are not tested before being laid.

One plan which I adopt to ascertain the state of the pipes is, to keep a record of the number of strokes of the pump by which the water is pumped periodically out of the syphons, and of the amount of rainfall; without a gauge an observant manager can form a sufficiently comparative idea of the latter. By adopting this method, and by losing no time in finding the cracked and decayed pipes thus indicated, a great amount of leakage arising from them would be prevented. JOHN MARTIN.

Ormskirk, June 15, 1867.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

1819.—GEORGE DICKIE, of Kilwinning, in the co. of Ayr, N.B., for "*Improvements in the manufacture of illuminating gas.*" June 21, 1867.

1820.—GEORGE SIMPSON, of Whitburn, in the co. of Linlithgow, N.B., for "*Improvements in charging and emptying retorts, and in the machinery or apparatus employed therefor.*" June 21, 1867.

1821.—FRANCIS REDDICLIFFE, of Seglenlas Mine, Llanidloes, in the co. of Montgomery, mine agent, for "*Improvements in buckets for pumps, especially suitable for pumps for mines, and in pistons for steam and other engines.*" June 21, 1867.

1822.—EMORY M'CLINTOCK, of the Langham Hotel, in the co. of Middlesex, gentleman, for "*Improvements in the construction of motive-power engines and pumps.*" June 21, 1867.

1827.—STEPHEN HOLMAN, of 10, Laurence Pountney Lane, London, in the co. of Middlesex, engineer, for "*Improvements in double-action pumps, and in the methods of operating pumps, part of which improvements are applicable to other reciprocating machines.*" June 22, 1867.

1828.—THOMAS WILSON and WILLIAM HALL, both of the town and co. of the town of Newcastle-upon-Tyne, engineers, for "*Improvements in machinery or apparatus for raising and forcing water and other fluids.*" June 22, 1867.

1834.—THOMAS RAFFERTY, of Manchester, in the co. of Lancaster, gas engineer, and JOHN HENRY STOREY, of the same place, brassfounder, for "*An improved apparatus to be employed in moving from place to place, laying down, and jointing metal pipes.*" June 24, 1867.

1837.—ELLIOTT PERRY GLEASON, of the city and co. of New York, U.S.A., gentleman, for "*Improvements in cylindrical or Argand gas-burners.*" June 24, 1867.

1846.—THOMAS CROW, of West Ham, in the co. of Essex, tar distiller, for "*Improvements in the manufacture of illuminating gas from gas-tar oil or from gas tar.*" June 25, 1867.

1849.—ADAM AITCHISON, of 6, Park Terrace, Peckham, in the co. of Surrey, and THOMAS SOUTH, of Bridge Street, Southwark, in the said co., gas engineers, for "*Improvements in means or apparatus for the production of gas for illuminating and other uses from hydrocarbons, which apparatus is also adapted to be used for culinary and other heating purposes.*" June 25, 1867.

1898.—PAUL ZABOUBINE, of the city of St. Petersburg, in the empire of Russia, gentleman, for "*An improved sucking and forcing hydro-pneumatic pump with no piston.*" June 29, 1867.

1931.—JOHN SOMERVILLE, of the Gas-Works, Maidstone, and ROBERT ELSDON, of Maidstone, in the co. of Kent, engineer, for "*Improvements in the treatment of apparatus employed in the manufacture and materials used in the purification of gas.*" July 3, 1867.

1967.—WILLIAM ROBERT LAKE, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, consulting engineer, for "*Improvements in the manufacture of illuminating gas, and in apparatus employed in the said manufacture.*" (Complete specification.) A communication. July 4, 1867.

GRANTS OF PROVISIONAL PROTECTION.

1427.—ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the co. of Middlesex, for "*Improvements in the means of raising liquids, and in apparatus for the same.*" A communication. May 14, 1867.

1671.—AUGUSTUS LEA BRICKNELL, of Stratford-on-Avon, in the co. of Warwick, for "*Improvements in rotary pumps.*" June 7, 1867.

1684.—JAMES WARBURTON, of Hythe, in the co. of Kent, for "*Improvements in apparatus for registering and recording the quality of gas.*" A communication. June 7, 1867.

1694.—NATHAN THOMPSON, of 15, Abbey Gardens, St. John's Wood, in the co. of Middlesex, for "*Improvements in unions or apparatus for connecting together pipes or tubes, and for stopping the ends thereof.*" June 8, 1867.

1748.—GEORGE M'KENZIE, of Glasgow, in the co. of Lanark, N.B., for "*Improvements in the manufacture of illuminating gas.*" June 15, 1867.

NOTICES TO PROCEED.

439.—WILLIAM HILL and HENRY CHARLES WILBERFORCE, both of the city of York, for "*Improvements in gas cooking apparatus, and in steaming, caking, boiling, and roasting apparatus.*" Feb. 18, 1867.

458.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in the application of certain hydrocarbons to the obtainment of light and heat, and in the apparatus or means to be employed therein.*" A communication. Feb. 20, 1867.

495.—WILLIAM EDWIN HEATH, of 7, Pembroke Terrace, Chalk Farm, in the co. of Middlesex, for "*Improvements in gas-pressure governors.*" Feb. 22, 1867.

499.—ARTHUR KINDER and WILLIAM BARNS KINSEY, both of 92, Cannon Street, in the City of London, engineers, for "*Improvements in gas-engines.*" Feb. 23, 1867.

534.—FRANCIS VERE WRIGHT, of St. James's Place, in the city of Westminster and co. of Middlesex, gentleman, for "*Improved adjustable reflectors for lamps and lighting purposes.*" Feb. 27, 1867.

556.—ADOLPHE GILBERT CHALUS, of 2, Rue Sainte-Appoline, Paris, empire of France, merchant, for "*Improvements in apparatus for producing artificial light from gas, air, and liquids.*" Feb. 28, 1867.

563.—ALEXANDER ANGUS CROLL, of Coleman Street, in the City of London, civil engineer, for "*Improvements in the treatment of liquid hydrocarbons for the purpose of obtaining a permanent gas.*" Feb. 28, 1867.

565.—JAMES HARBERT and FREDERICK GOODMAN, both of Kidderminster, in the co. of Worcester, for "*Improvements in destroying explosive gases in coal and other mines, in order to render them safe for the miners to enter.*" Feb. 28, 1867.

650.—WILLIAM YOUNG, manager of the Oil-Works, Straiton, in the co. of Mid Lothian, N.B., and PETER BRASH, of Leith, in the same co. soap, candle, and oil manufacturer, for "*Improvements in the distillation of bituminous substances.*" March 7, 1867.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, JUNE 24.

The ENFIELD GAS Bill was read a third time, with the amendments, and passed, and sent to the Commons.

The WALLASEY IMPROVEMENT Bill was reported from the Select Committee, with amendments.

TUESDAY, JUNE 25.

The HERNE BAY WATER, and the PETERBOROUGH WATER Bills, were returned from the Commons, with the amendments agreed to.

The WIDNES GAS, WATER, AND IMPROVEMENT, and the PLYMOUTH CORPORATION WATER, &c., Bills, were read a third time, with the amendments, and passed, and sent to the Commons.

THURSDAY, JUNE 27.

The LEEDS CORPORATION WATER Bill was reported specially from the Select Committee, with amendments.

The WOLVERHAMPTON NEW WATER, and the WALLASEY IMPROVEMENT Bills, were read a third time, with the amendments, and passed, and sent to the Commons.

FRIDAY, JUNE 28.

The LAMPETER, LLANDYSSIL, &c., GAS Bill was returned from the Commons, agreed to, with amendments. The said amendments considered and agreed to.

The CRICKHOWELL GAS AND WATER Bill was returned from the Commons, with the amendments agreed to.

MONDAY, JULY 1.

The LEEDS CORPORATION WATER Bill was read a third time, with the amendments, and passed, and sent to the Commons.

TUESDAY, JULY 2.

The WIDNES GAS, WATER, AND IMPROVEMENT; ENFIELD GAS; and the PLYMOUTH CORPORATION WATER, &c., Bills, were returned from the Commons, with the amendments agreed to.

The EAST LONDON WATER (THAMES SUPPLY), and the EAST LONDON WATER (VARIOUS POWERS) Bills, were referred to a Select Committee, consisting of Earl Airlie (chairman), Earl Dartmouth, Earl Nelson, Earl Harewood, and Lord Raglan, who will meet on Thursday next, at eleven o'clock.

THURSDAY, JULY 4.

The EAST LONDON WATER (THAMES SUPPLY), and the EAST LONDON WATER (VARIOUS POWERS) Bills, were reported from the Select Committee, with amendments.

FRIDAY, JULY 5.

The WALLASEY IMPROVEMENT, and the WOLVERHAMPTON NEW WATER Bills, were returned from the Commons, with the amendments agreed to.

HOUSE OF COMMONS.

MONDAY, JUNE 24.

The HERNE BAY WATER, and the PETERBOROUGH WATER Bills.—The Lords amendments were agreed to.

The LAMPETER, LLANDYSSIL, &c., GAS Bill, as amended, was considered.

The METROPOLIS GAS ACT.—Petition of gas consumers, ratepayers, and others, within the limits of the Metropolis Gas Act (1860), for alteration, referred to the Select Committee on the Bill.

The METROPOLIS GAS Bill.—The petition of Henry Brown, against the Bill, referred to the Select Committee on the Bill.

The METROPOLIS SUBWAYS Bill.—The petition of the Ratcliff Gaslight and Coke Company, praying to be heard by counsel against the Bill, referred to the Select Committee on the Bill.

THURSDAY, JUNE 27.

The CRICKHOWELL GAS AND WATER Bill.—The Lords amendments were agreed to.

FRIDAY, JUNE 28.

The LAMPETER, LLANDYSSIL, &c., GAS Bill was read a third time, and passed, with amendments.

MONDAY, JULY 1.

The WIDNES GAS, WATER, AND IMPROVEMENT; ENFIELD GAS; and the PLYMOUTH CORPORATION WATER, &c., Bills.—The Lords amendments were agreed to.

TUESDAY, JULY 2.

The WALLASEY IMPROVEMENT, and the WOLVERHAMPTON NEW WATER Bills.—The Lords amendments were agreed to.

HOUSE OF COMMONS.

METROPOLIS GAS ACT AMENDMENT BILL, 1867.

EIGHTH DAY—WEDNESDAY, JUNE 5.

(*Continued from page 515.*)

Mr. *Harry Chubb* recalled, and cross-examined by Mr. O'MALLEY.

I now hand in the paper I was referring to in my evidence. It is altered by being worked out in decimals:—

Analysis of the Accounts of the Imperial Gas Company for the Year 1866.

		Amount.	Per 1000 Feet Gas sold.	
INCOME—				
Gas-rental		£477,037	48·09d.	
Rental of meters	£8,671			
Less repairs	5,071			
		3,600	·36	
Old materials		1,124	·11	
Interest		358	·04	
			£482,119	48·60d.
EXPENDITURE—				
Coals		£246,560	24·86d.	
Less products		99,884	10·07	
		146,676	14·79	
Management		21,308	2·15	
Manufacture	£369,291			
Less coals	246,560			
		122,731	12·37	
Distribution	£38,191			
Less meter repairs	5,071			
		33,120	3·34	
Law and parliamentary charges		1,854	0·18	
Bad debts		3,263	·33	
			328,932	33·16
Profit			£153,187	15·44d.
Required for interest on borrowed capital		£27,687	2·79d.	
Do. contingent fund		3,000	·30	
Do. dividend at prescribed rates		130,309	13·14	
		£160,996	16·23	
Profit as above		153,187	15·44	
Deficit		7809	0·79	

In 1864 we got an increase of £650,000 share capital, and we then came under all the restrictions of the Act of 1847. We had the same works—at St. Pancras, Shoreditch, and Fulham—in 1854 as we have now, but the district we now supply is less than it was in that year. That £650,000 was expended in enlargement of the works generally. The district was somewhat contracted in 1857, but some of the districting arrangements took place earlier than that year. The districting that took place in the year 1857 related simply to the London Company and to part of the Western Company—the district that they now hold. The London Company were competing with the Imperial Company in the parish of St. Pancras to a certain extent, and the Western Company in the Kensington district; but a portion of that had been settled with the Western Company in the year 1830. The districting arrangements in that year comprised the British, then the Commercial, in the east, and the Independent, and a portion of the western districts.

Mr. O'Malley: Will you look at that map [handing one to witness]; does that correctly represent what districts you had in 1857, and what you gave up in that year? That is the map which was presented to Parliament in the year 1859.

Witness: I was not secretary of the company at the time, and it is exceedingly difficult for me to tell upon the map the exact state of the case.

The Chairman: You say that that map was laid before Parliament in the year 1860?

Mr. O'Malley: Yes; it was ordered by the House.

Mr. Richards: If that is so, we do not dispute it, of course.

The Chairman: We will assume that it is so unless there is any dispute about it.

Mr. O'Malley: That will answer our purpose.

Mr. Richards: We fully admit that that is correct, if it is the map that was laid before Parliament.

Mr. O'Malley: It would be very important that the committee should have before them the Blue-Book of 1860.

The Chairman: If it is important, there are means of bringing it before the committee.

Cross-examination resumed: That £650,000 was expended between 1854 and 1864. I have not got the outlay from year to year, but it has been very gradual; as occasion required, that money was called up and expended. We commenced to pay the 10 per cent. dividend upon that sum as soon as the shares were paid upon.

By the Committee: Only upon that portion which was paid up.

Cross-examination resumed: I am not sure whether the 10 per cent. was paid upon that capital before the works for which it was raised were completed, or could become productive; but it has been allowed from the moment the call was made.

Mr. O'Malley: Then does it not follow that it was allowed before the works could become productive?

Witness: I do not know the circumstances; there might have been other means of doing it.

The Chairman (to Mr. Richards): Is there any dispute upon that point?

Mr. Richards: What has been done in some instances is this: the money has been raised on debentures and expended in works, and that money having fructified, you paid off the debentures by calling up fresh capital?

Witness: That was so.

Cross-examination resumed: The last call was made on that second £650,000 in January, 1865. It was a call of £5. The one preceding was in July, 1864. The half year ending July, 1865, was the first period that we paid a dividend on the whole capital of £1,300,000. The half year before that there was only £45 paid on one portion of the capital, and £50 paid on the first £650,000. The dividend was £29,250 on one portion, and £32,500 on the other.

The Chairman: We understand that the company have acted upon the plan of issuing capital and paying a dividend upon it as soon as it has been issued, not waiting for the time when the works became productive for which it was issued. But shall we be any wiser for this detailed examination? Is not your object to show that that was their course of proceeding?

Mr. O'Malley: Certainly.

The Chairman: But that is admitted.

Mr. O'Malley: What I wanted to see was, whether that was really the course of proceeding.

The Chairman: But they make the admission.

Mr. O'Malley: I wanted to carry that further, but I see I cannot. (To witness:) Now, as to your £130,000. Did the debentures represent, in fact, £280,000, which is alleged as appropriated from the profits to the capital?

Witness: It is stated in the Act of 1854 to be £280,000 and upwards, and the sum was actually £338,000 odd. That sum was applied to the enlargement and improvement of the works, and things of that kind. It was proved before Parliament that that sum had been expended, and the result was that £13,000 a year was allowed for the interest on that money.

Mr. O'Malley: You stated yesterday that an amount of £600,000 would be required to make up your past dividends.

Witness: Yes; up to 1854.

Mr. O'Malley: Did it strike you that £329,000 ought to be deducted from that £660,000?

Witness: No.

Mr. O'Malley: Did not the taking it out of profits, and applying it to capital purposes, make a vacuum of so much in your dividends?

Witness: I do not see that at all.

Mr. O'Malley: But if the £329,000, instead of being applied to capital purposes, had been applied to dividends, your dividends would have been much larger during that period?

Witness: Yes; they were not paid.

Mr. O'Malley: So that, in fact, the £329,000 was a parliamentary repayment of defective dividend to that extent?

Witness: I do not see that.

The Chairman: I do not follow this cross-examination, but it is, perhaps, my fault. We should be very glad to hear any comments from you by-and-by; but, if the facts are undisputed, it is only occupying the time of the committee to hear arguments from the witness. We do not care a farthing for arguments that come through a witness.

Mr. O'Malley: But I was afraid I was assuming something the witness had not said.

The Chairman: The witness says that a certain sum that had been saved from the profits and expended as capital, was afterwards, under the sanction of the Act of Parliament, restored to capital in a certain form, and interest paid upon it.

Mr. Richards: That is so. This is a matter which stands visible on the face of the Act of Parliament—"and whereas the company have expended," and so on.

The Chairman: So I understand it. We shall be most happy to hear comments by-and-by; but it is no use to ask this witness things which he knows imperfectly, he not having been an officer of the company at the time when they occurred.

Mr. O'Malley: On the Statute it appears to be £280,000 and upwards, and according to the witness it is £328,000.

The Chairman: Suppose it does, that does not carry it any further.

Mr. Richards: Again, the Act of Parliament explains that.

Mr. O'Malley: I would not ask these questions if I did not see the importance of them; I will only pray that the same patience be extended to me as has been extended to my learned friends on the other side.

The Chairman: Equal patience has been extended, and will be extended, to all sides; but the members of the committee will all agree in this, that they will take facts from the witnesses and arguments from the counsel.

Mr. O'Malley (to witness): When you told the committee that the deficiency of the capital to be made up to the year 1854 would amount to £600,000, you excluded from your calculation the £329,000?

Witness: Yes; because I had no idea it formed any part of the question, nor have I that idea now.

Cross-examination continued: Of our new issue of shares for £300,000 we had raised £55,000 to the end of December. A call was made upon those that were issued. A deposit was required of £3 per share, and the holders were allowed to pay up if they desired to do so. We had only issued, up to the 31st of December last, 17,640, and upon those the deposit was paid, and some calls in advance. Under the Act of Parliament we were bound to offer them to the shareholders rateably. We have not offered any to the public in any public manner. We ascertained there would be a difficulty in getting rid of them, by inquiring of the sharebroker as to the steps that should be taken to issue them. I do not think our 10 per cent. shares were quoted in the stock market in 1866 at 82 and 83; they might have been the year before. I do not think last year they were higher than 73. I only speak from memory, but they might have been 76. At 76 the interest the purchaser would get would be under 7 per cent.

Mr. O'Malley: What circumstance was there to make the second shares bearing 7 per cent. less valuable than the 10 per cent., because you get 7 per cent on your new shares?

The Chairman: It is very evident that there was one circumstance, because one might rise and the other might not.

Mr. Richards: They were issued in December.

Mr. O'Malley: I am not aware that one might rise and the other not.

Mr. Goldney: The 10 per cent. shares are entitled to 3 per cent. in addition after the 7 per cent. are paid all round.

Mr. O'Malley: But the 10 per cent. shares are now getting their maximum. A man who bought the 10 per cent. shares at 73 would be getting under 7 per cent. for his money, while the man who bought at par the 7 per cent. shares would be getting more than the other man.

Witness: Our shares have fallen considerably since that; they have been as low as 63. The parliamentary agitation reduced them to that.

Mr. O'Malley: But can you offer any explanation why the purchaser of the 10 per cent. shares should be content with a less interest than the purchaser of the 7 per cent. shares?

Witness: My impression is that the shares were still lower in value at the end of last year than 72. I thought you spoke of the average throughout the year. I have no doubt it can be got correctly at the Stock Exchange.

Mr. O'Malley: I find from this document that in 1865 it was 85 ex div. and 83½ ex div.

Mr. Richards: What is that paper?

Mr. O'Malley: It is the Stock Exchange list.

The Chairman: I have done my best to shorten what appears to us a useless cross-examination. The committee agree with me in that, but we are waiting until some light bursts upon us.

Mr. Denison: Let me help you, sir. My learned friend, Mr. O'Malley, says he has got a document there. I dare say he has, but he is examining the witness, and can only ask him a question.

The Chairman: Put your question, Mr. O'Malley, and we will see whether it is objected to.

Mr. O'Malley: I ask you whether your 10 per cent. shares in the year 1865 were not selling at 84½ and 83½ ex div.—the highest and lowest?

Witness: I cannot say.

Mr. O'Malley: I am very unwilling to go on, if the committee wish me not to continue.

The Chairman: I am very unwilling to stop a cross-examination, because a greater latitude is always allowed than in direct examination; but the committee feel with me that the cross-examination is not carrying us any further.

Mr. O'Malley: The witness in his direct examination stated that they could not get the 7 per cent. shares off their hands, and my object was to show that that was not correct.

The Chairman: You have got from the witness what is very important—viz., that they did not offer them to the public.

Mr. O'Malley: Then I wanted to get the premium.

The Chairman: The witness does not know the premium. You can make any comment you please afterwards.

Cross-examination resumed: We have no engineer-in-chief now. One of our engineers retired at the end of last year, and temporarily two of our works have been put under one engineer; still, we have no chief engineer.

Mr. O'Malley: I see by your accounts here, which were put in the other day, that your working expenses, less the sum applicable to the payment of interest upon your disbursements, was £430,534, leaving out the shillings. If you deduct those payments, bad debts, contingency-fund, and so on, your expenditure amounts to £430,534?

Witness: I have no such paper before me, and I think it would be convenient if you took the same paper as I have.

Cross-examination continued: Our whole expenditure was £587,074; the dividends, interest on borrowed capital, bad debts, and contingency-fund, give £156,540 without the shillings, leaving that amount of £430,534 as the expenditure.

Mr. O'Malley: Now, in your account which was returned last year, which is in the Blue-Book, the same figure is £181,045, and taking that from the expenditure, it leaves £394,277, independently of the payment of interest. Now, how do you account for the difference between £430,534 expended in one year, and £394,277 in the next? I want the different items, because it makes me mistrust the accounts (if you will excuse my saying so) when I see a difference of £38,000.

Witness: I think the accounts speak for themselves, they being subdivided under the different heads of management and distribution. There is a difference of £30,000 on coals; in the first year the charge was £216,937, and in the next year it was £246,560.

Mr. O'Malley: Now, that leads me to ask what you have not supplied in your evidence. Can you tell me how many tons of coal were consumed in making gas in 1866?

Mr. RICHARDS: There is a sum on the face of the accounts of £27,000 carried to the reserve-fund, which my learned friend has not noticed.

Mr. O'MALLEY: I have taken that into account; it has nothing to do with it.

Cross-examination continued: In round numbers, 299,000 tons of coal were carbonized. In the previous year there were 270,000 tons. That quantity includes both cannel and Newcastle. In 1865, Newcastle coal was 251,000 tons, and cannel 19,000 odd tons—close upon 20,000. Last year it was 273,000 tons Newcastle, and 25,800 cannel. I should not think we use 10 per cent. of cannel all the year round; it is unequal. It depends on the quality of the Newcastle coal that is being used, and the condition of the coal. We use cannel so as to bring up the illuminating power of the Newcastle cool to the mark. We buy all the cannel as of one quality. In the winter time the gas is more difficult to keep up to the illuminating power than in the summer. We light a good many parishes—Marylebone and St. Pancras among the rest. In Marylebone a 4-feet burner is used, and in St. Pancras a 5-feet burner.

Mr. O'MALLEY: That 5-feet burner works out to £3 7s. in Marylebone, and £4 1s. in St. Pancras.

Witness: They are not the same.

Mr. O'MALLEY: Is there any reason, except the difference in the burner, for charging less per lamp to the Marylebone parish than to St. Pancras?

Witness: The rate of charge for gas is not the same. It is less in Marylebone than in St. Pancras. The price in Marylebone is just 3s. per 1000, and in St. Pancras 3s. 3d. In the case of Marylebone, it is a charge that has existed for many years—in fact, from old times—and it has not been altered. I am not able to say what was its origin. It has been so from 1852. The price to the public in that year was 4s. 6d. I cannot go back so far as that, and say whether it was in respect of purchase of goodwill, or anything of that kind. The money received from the 17,000 shares we issued was expended in increasing the works and in paying the debts of the company. We carry our mains through the districts of other companies. There are two mains from Fulham—one runs up the King's Road, Chelsea, across Hyde Park, to Oxford Street; and the other goes in the rear, across Kensington Palace Gardens.

Mr. RICHARDS: It was put into your mouth that you spent £85,000 in the current expenses. I understand that you have raised capital to that amount, and that at the time you did so you were in debt to the bankers?

Witness: Yes.

The CHAIRMAN: We do not at all suppose that you have confused your revenue and capital accounts.

Re-examined by Mr. RICHARDS: I understand there has never been any competition in Marylebone; but in St. Pancras there was at one time a very active competition between the London and Imperial. The London Company retired in 1857. At the present moment the price to the parish of St. Pancras is 9d. less than it is to the public.

Mr. RICHARDS: There is a theory—I do not say it is a right one—that the public lamps should be supplied cheaper than private consumers.

Witness: Yes.

Mr. RICHARDS: On public lamps there is considerable waste of gas in the amount of main required, is there not?

Witness: Yes; that, no doubt, accounts very largely for the unaccounted-for gas. In places where there was competition, the price per 1000 feet to the public lamps was a little higher than in places were there was none.

Re-examination continued: The money market last year was in such a condition as to render it impolitic in any company to put shares into the open market. At that time, and immediately afterwards, the shares that were out, with £3 paid, were at a discount. Although our district is diminished, the demand for gas has increased at the rate, on an average, of 10 per cent.

Mr. RICHARDS: You were asked about a certain excess. Am I right in saying that the excess in 1866 over 1865 in coals amounts to £23,000?

Witness: Upwards—£23,328.

The CHAIRMAN: We have been told that there was a difference in the expenditure of £30,000 for coals.

Mr. RICHARDS: We do not agree to that.

Mr HOPE SCOTT: We think it better to take that as the residual products.

Re-examination resumed: The increase in management was £266; manufacture (including labour), £8700; making a total, with the increase of coals, of £32,294. Then there is a decrease in 1866 of distribution of £1970; law and parliamentary expenses, £1100; making a total of £3070 to be deducted from the £32,294, which leaves the result actually shown. That is an increase in our expenses of 7 per cent. in all; and the increase of gas sold in 1866 was 8 per cent. In every instance where a call has been made, it has been in January and July, immediately after the half-yearly meeting. Since my connexion with the company, not one halfpenny has been called up until it has been actually required for the execution of the company's works, and to meet the demands of the public.

Mr. *T. N. Kirkham*, examined by Mr. HOPE SCOTT.

I am one of the engineers of the Imperial Company, and have been in their service for more than 20 years. My father was one of their engineers before me. I direct the Fulham station. At the three stations nearly 300,000 tons of coal were carbonized last year. We only make common gas, and the bulk of the coal is Newcastle coal; the per centage of cannel is a little under 9 per cent. At times we have to increase it to keep up the illuminating power. Sometimes we use as much as 11 per cent. The quantity of gas made was 2838 million cubic feet, and the quantity sold 2,380,521,000 cubic feet. The per centage of unaccounted-for gas is about 16 per cent. Before the Act of 1860 our illuminating power was fixed at 12 wax candles, but in that year it was altered to 12 sperm candles. That is a difference of nearly 16 per cent. It is nearly 2 candles. We have supplied, on an average, since 1860, 14 and 14½ candle gas in the districts. There is very little difference at the works. Our gas has been regularly tested by some public authority. I have never heard it has been below the standard. A supply has been given in every case where demanded. We have a testing-house at each station. We allow both the official examiners and the public access to those places at any time upon application. We have never had any proceedings against us for breach of the Act of Parliament, nor any inquiry by the Home Secretary, nor any interference through a magistrate. There are fourteen local authorities within our district.

Mr. HOPE SCOTT: There are fourteen inquisitors in your district; you are in the face of a fourteen-headed public, so to speak. How many of the districts have appointed examiners for the purpose of testing the gas?

Witness: Only three—Marylebone, St. Pancras, and the Board of Works for the Hackney district. As a matter of fact, that provides testing-places for the gas from all the works. It represents the three stations. Marylebone tests Fulham, in the Marylebone district, about 4 miles from the works. Carbonizing wages have risen 25 per cent. since the year 1860. Coals have advanced in price, but I am not so well able to speak to that. I do not find the increase in the price of coal, as a rule, compensated for by increase in the price of the residual products. The sale of coke is governed by the ordinary rule of supply and demand, and has no relation to the price of coal. We must make the coke whether we sell it or not, and we must get it off the premises somehow. If the weather is dark, heavy, and misty, we require an extra production of gas; and it frequently happens that at such times the weather may be extremely mild, so as to cause no market for coke at all. I cannot tell you how many chaldrons of coke we make during the winter months.

Mr. WEBSTER: What tonnage?

Mr. HOPE SCOTT: You will see in a moment, if you will trust me with my own case.

Examination continued: As a rule, we make a chaldron of coke from every ton of coal. We have made as much as 5000 chaldrons in a week, and we have no room to keep such a quantity as that. The make of gas is pretty equally divided between the three stations. Though we may be making the same quantity of coke at the three stations, that does not regulate the price. At the Shoreditch station we get 8s., and at another station 11s. In my own neighbourhood the Equitable are getting 10s. for their coke. I think we are a little above them. That is within two miles. The price varies from week to week. It may be just the opposite in another fortnight or three weeks. The burners by which our gas is tested are the same now as they were when the Metropolis Gas Act was passed; the only difference being that the top is made of steatite, and in the other case it was made of iron, but the dimensions are practically the same.

Mr. HOPE SCOTT: You have heard, I suppose, what Mr. Cleminshaw said about the leakage, and the labour attendant on the leakage in London, which he put at 1s. per 1000 feet?

Witness: All I can say is that we have no proof of that in London; the average in London is something like 4d. for leakage. It is not the fact with regard to our own company that we have any duplicate mains which could increase the actual leakage or escape of gas. I think they were all taken up as opportunity offered. The gas has been cut off from all the duplicate mains. In nearly every street we must have a pipe down each side, otherwise we should have to carry the service-pipes across. The leakage is much more connected with the service-pipes than the mains, because of the decay of the wrought-iron pipes; the mains are cast iron. The small wrought-iron pipes oxidize much quicker than the mains. I am one of the engineers who put their names to the statement of cost of manufacturing 18-candle gas. Taking one ton of coal at 16s., about 12 bushels of fuel are required for carbonizing, representing 3s. in Newcastle coal, making 19s. in all; that is 12-candle gas. The value of the products—coke, tar, and ammoniacal liquor—is 10s. 1d. That is founded on my actual experience for 12 sperm candle gas. The gas we actually make has an average of over 8 per cent. of cannel. That makes a difference of 2·45d. per extra candle, and we have made the gas equal to 14 candles.

Mr. HOPE SCOTT: I may take it, with regard to this table, you support per 12-candle gas all the items which are put here on both sides?

Witness: I do. My experience confirms the fact that a ton of Newcastle coal will not produce over 9500 feet of gas. I never heard, as a practical matter, of 10,000 feet of 15-candle gas being got from a ton of Newcastle coal.

Mr. HOPE SCOTT: Now we will go to the 18-candle table; that again, I take it, is gas issuing from the works?

Witness: Yes. I know that Mr. Cleminshaw has suggested that half a ton of Wigan cannel and half a ton of Newcastle coal would produce the illuminating power required, but my experience says no. I also know that Mr. Stevenson took it at 3/10ths Newcastle, and 7/10ths cannel, but my experience leads me to the conclusion that it must be in the proportion of 3/4ths to 1/4th. It is Wigan cannel I use. I have used 70,000 or 80,000 tons within seven or eight years. I do not know what particular seam it is, but only that it is sold as Wigan coal in London. The price is 27s. delivered in London at the present time.

Mr. HOPE SCOTT: Now another point of attack of Mr. Cleminshaw's is as to fuel—"12 bushels at 3d., or 3s."—whereas on the other side you show 15 bushels of Wigan at 5s. a chaldron, which he says might have been better employed in the retort, while the Newcastle coke, which was represented by the 3d., had better have been sold. Now, would the Wigan coke produce the same carbonizing results as the Newcastle coke?

Witness: It would not. My experience is, that when using Newcastle coke for carbonizing the Newcastle coal we want about 33 per cent. of the coke produced; whereas with the Wigan coal using Wigan coke we want upwards of 50 per cent. I have always found that to carbonize Newcastle coal with Wigan coke would be utterly impossible. The fuel from the Wigan coal is inferior to the Newcastle coke. The Newcastle coal is more difficult to distil than the Wigan cannel. Assuming the question of heat, Wigan coke might suit as well for carbonizing Wigan coal, but when we get Newcastle coal, an additional difficulty arises with regard to the Wigan coke. I think the engineers were right decidedly in preferring to take 12 bushels of Newcastle coke at 3d. to adopting Mr. Cleminshaw's suggestion. We use very little Scotch cannel. I have used Boghead, but it was some years ago.

Mr. HOPE SCOTT: Mr. Cleminshaw puts down the tar at 1s. 5½d., instead of 1s. 3d. What is your experience in that respect?

Witness: Our experience in London is very different from that; we did not get more than 1d. a gallon for our tar for some years. It is put down in our table at 1½d. The breeze we nearly agree about, therefore the principal difference is about the coke, which he would put down as worth 6s. 2d., against 4s. 7d. I adhere to all the figures in our table as against Mr. Cleminshaw's. We get a little more for the tar from a ton of Wigan than we do from a ton of Newcastle. Fifteen bushels of coke from three-fourths of a ton of Wigan cannel is a very fair average, and from a quarter of a ton of Newcastle coal 9 bushels. I know what Mr. Bell, one of the witnesses for the petitioner-promoters of this bill, has said about the rise in money on each additional candle light. I put it at a fraction under 2½d. He says 1½d. to 2d. as the mean.

The CHAIRMAN: Do I understand you to be saying that if we go from 14 to 18 candles, we may count 2½d. as the scale per candle?

Witness: Yes; the scale will run from 12 candles to 20 at 2½d. per candle.

By Mr. HOPE SCOTT: The cost of coals per ton is put by the engineers, per 18 candles, at 24·25s. Mr. Bell's charge is 17·20s., but we add the difference in the price of coal to Mr. Bell's candle and a half, and it comes out precisely as estimated by the engineers. We took the cost per candle at 1½d., and applying the same calculation to 24s. 3d., found that it raised Mr. Bell's 1½d. to 2·46d. We agree with him in principle; the only question is about the starting-point in the price of coal.

Cross-examined by Mr. WEBSTER: Eleven shillings per chaldron is not the highest price we have received. It depends upon the season. It occasionally rises to 12s. It has not been more than that of late years at my station. In some cases we have contracts for our coke. We deliver it to them, or into their barges rather. Some of these contracts are for six

months, and some less; some are as much as 12 months. We sell it to the public as they come for it. My experience teaches me that the price of coke does not depend on the price of coal, but on the stock we have on hand.

The CHAIRMAN: Taking different years, suppose you have a year in which the price of coal is low and another year in which it is high, will there be no difference in the average price of coke during those periods?

Witness: It is no criterion at all. We pay 17s. for coal, and we get on an average 8s. 6d. for coke; another year, when we are only paying 16s. for coal, we get a higher price. It varies very much; we can make no rule.

Cross-examination resumed: Our contract prices vary according to the quantity a person takes. Our stock of coal varies very much with the season. On an average of years we are sometimes short of coal, and sometimes we have a large stock. It should average on five years. It would not be the same with regard to the stock of residual products. We get rid of them as fast as we can.

Mr. WEBSTER: Can you tell us the comparative cost of management during five or six years, on an average?

Witness: No; it is not in my department at all. I have nothing to do with the accounts; I merely make the gas.

Mr. WEBSTER: What is the principal element in the cost of manufacture distinguished from the cost of raw material—I mean the principal element of variation?

Witness: The price of coal.

Mr. WEBSTER: But I exclude the price of coal. Excepting the price of the raw material, what is the principal element of variation in the cost of manufacture?

Witness: The residual products.

Mr. WEBSTER: I exclude that also. Is there, then, any material element of variation in the cost of manufacture, except the price of labour?

Witness: No; our labour has increased since the year 1860 to the extent of 25 per cent—that is to say, on our carbonizing the coal. Mechanical labour has risen about 10 per cent. There is no element of variation in successive years in the cost of distribution.

Re-examined by Mr. HOPE SCOTT: We are often surprised at the turn the price of coke takes. In the year 1864 the price we obtained for our coke was 5s. 6d., and the price of coal was 15·91s. In 1865 the price of coal was again nearly 16s., and we got 5s. 5¾d. for coke. In 1866 our coals were nearly 16s. 6d., and coke 5s. 1d. Looking to my experience in the variation of prices, I think 9s. for Newcastle coke is a very fair price indeed.

Mr. WEBSTER: One question with regard to the burner. Does that diagram [showing it to witness], with regard to the number of holes and the diameter, represent the old and the new burner—is there any difference in their diameters?

Witness: There is not, according to my experience. Up to 1860, and since, in the burner we were using, the holes were No. 40, by the Birmingham wire gauge. That was an iron burner, with a pressure of 2/10ths of an inch, showing an illuminating power of 16·38; and with a Sugg's burner, of the same sized hole and the same pressure, we obtained 16·37; another experiment gave us 15·49 against 15·5.

Mr. WEBSTER: You have not been in the habit of using, under the designation of the old burners, burners of less diameter than the old?

Witness: No; I do not know those burners.

Mr. WEBSTER: As between the burners in use previous to 1860 and those in use since, do you know of a difference on the outside between them—one being 15/30ths of an inch and the other 15/20ths of an inch in diameter?

Witness: There are such burners, but we do not use them; I only speak of my own practical experience.

By the COMMITTEE: The price of manufacture of gas at our three stations is about the same. There is a little difference in the price of coal, but over a series of years it would be about the same.

Mr. *Thos. Hersey*, examined by Mr. RICHARDS.

I have been chief inspector of the Imperial Company for 14 years, and am quite familiar with the position of the mains running throughout the district. Under the districting arrangements we received upwards of 70 miles of mains from the London Company. They were valued at nearly £33,000. The Imperial ceded to the London about £16,000 in mains. The balance in favour of the Imperial was thus about £16,000. We have taken up something like 10 miles of those mains. About a mile are left in the ground, cut and left dead. They were not worth taking up; but if an opportunity offered, by the breaking up of the streets, we should remove them. The remainder of the mains are in full use now. We required them all. Most of them were in good condition. Four or five mains would be as large as 16, 18, or 20 inch; but the bulk were small—6 inch and downwards. There is no possibility of any better mode of distribution being adopted than that we now employ. All the expenses connected with these mains have been charged to revenue.

Mr. *Robert Harris*, examined by Mr. HOPE SCOTT.

I am engineer to the Great Central Gaslight and Coke Company. The district supplied by that company is the whole of the City of London. I have been engineer to the company for the last eight years. The company got their Act of Parliament in 1851, but were formed in 1849. The company has only one station—at Bow Common, on the North London Railway. We consider that a very convenient spot for the delivery of coals; we get them delivered from ships on to the railway, and then into our works.

Mr. HOPE SCOTT: As a matter of fact, the different stations vary very much—to the extent of 1s. or 2s. in the price of coal, according to their situation in London?

Witness: I am hardly prepared to say, not knowing the method of delivery of the other companies.

Examination continued: We were forced to erect our works rather more than two miles from our point of supply. I believe the motive was to place them away from the population; but that was before I was interested in the company. Bow Common has been nearly covered with buildings within the last two years. I believe the company were started in opposition to the City of London and Chartered Companies, but I know nothing of its early history. We only make what is ordinarily called common gas, but we use cannel to a pretty considerable extent. Last year it was 12½ per cent. Giving it in tons it would be 45,012 Newcastle and 6336 cannel; together, 51,393 tons. The quantity of gas manufactured per ton of coal was somewhere between 9200 and 9300 cubic feet. The total quantity made was 472,556,000 feet, and the quantity sold 389,443,000. The per centage of unaccounted-for gas in 1866 was 17·16 per cent. From 1860, I presume, may be taken as the average age of our mains. It is difficult to say what is absolutely the leakage proper as escaping from the pipes themselves. I attribute a large quantity of unaccounted-for gas to the defective registration of the meters, and another large quantity to condensation in the mains—two miles being a considerable distance to travel. I have no reason to suppose there is neglect or want of proper arrangement of pipes. Our mains are, I believe, in a very fair condition—in as good a condition as we can keep them. They are situated in very crowded thoroughfares, where there is excessive traffic, and that has a tendency to dislocate the mains more than in country towns or suburban districts. The quantity of gas sold per ton of coal is 7577 cubic feet. The illuminating power of our gas has averaged during the last year 13·80 sperm candles within the City, and the gas made at the works is higher than that. On one or two occasions our gas has been reported by the public officer as below 12 sperm candles—on one occasion notably as low as 11·60; but at times and seasons it is from 12½ to 12. I think the maximum would be probably 16 candles. The 12½ per cent. of cannel is on the average of twelve months. I think we have gone as high as 20 per cent. in the winter time. I have not gone into the estimate of what would be the rise per candle above 12 candles. Our total capital expended up to the 31st of December last was £255,329. Per ton of coal carbonized it would be £5 3s. 6d. The total gas-rents and receipts for residual products for the year 1866 were £100,673, and the total outlay £78,608. That sum includes accidents and compensation. The net profit for that year was £22,065. A dividend of 10 per cent. upon the share capital and interest on the borrowed capital would have come to £23,300. Our entire capital is £260,000—£200,000 share capital, and £60,000 loan capital—and the difference between that sum and the £255,329 is used as working capital. The average price we paid for Newcastle coal in 1865 was 14s. 6d. per ton, and for cannel 20s.; in 1866, 15s. 5d. for Newcastle coal, and 21s. for cannel. We principally use Leeswood cannel, which is produced in Wales. When used by itself, it would produce about 21 candles illuminating power. Practically that is the highest that could be extracted from it. The quantity would be about 9500 feet per ton. I know nothing of the Leeswood cannel. The difference in price in those two articles increased our working expenses in 1866 by upwards of £2000. The price of residual products bears no relation to the price of coal at all. We have a fluctuating demand for coke. As the demand increases the price increases, and *vice versâ*. I cannot give you the dividend paid from the commencement, nor what was paid in 1860. I know the company were entitled to some back dividends, but the amount I cannot say. There is a great variation in the price of breeze—this year especially. Last year the variation was with us 6s. per chaldron, and this year we cannot make any contracts at all. It depends entirely upon the building and brick-making trades.

Mr. HOPE SCOTT: Do you know anything of the controversy between the corporation of the City of London and your company upon the subject of the price of gas?

Witness: I know that there was a deal of correspondence between the company and the corporation, but I am not acquainted with the details of it. It was entirely apart from my special avocations.

Cross-examined by Mr. RODWELL: We had a very bad fire in Wood Street. The damages, I believe, were set at £25,000, but as to costs I cannot speak. I am aware that the committee of 1866 referred to it in their report. That sum was paid out of moneys received for the sale of gas.

Mr. RODWELL: Can you account for the fact that you are getting your coal at this time at a lower rate than other companies in London? You heard what was stated by other witnesses, but your figure is lower—how can you account for that?

Witness: I do not think there is much difference as to the common coal; as to the cannel coal, there are two circumstances that I think will account for it. The first is, that we are directly on the North London Railway, which is a branch from the North-Western, and we get the trucks direct from the colliery into our works without any transhipment; and another cause, and the principle one, is that the cannel we use is of an inferior description to what has been called the Wigan cannel. I do not know any other reason for the difference, nor why other companies should not have got cannel coal at the same price we do, except the fact of railway carriage being cheaper. A call has been made within the last two or three years, but I cannot give you the date.

Mr. RODWELL: Am I right in saying that the profits upon your expended capital in 1866 were no less than 15¾ per cent?

Witness: I should say that is not correct. The profits in 1866 were 5 per cent. upon the loan capital, and 9 or 9½ upon the share capital. That appears by the published accounts.

Cross-examination continued: I believe the company were originally a consumers company. We were supplying gas at 4s. per 1000 till the Act of 1866 was passed; and it was raised in 1861 to 4s. 6d. I cannot tell you what the gas-works had been earning before that per annum. There was an award to Mr. Croll on arbitration, but that was before my connexion with the company. That is not represented as part of the capital of the company, I believe.

Mr. RODWELL: On the average of five or seven years, do you find per annum that the per centage of the value of the residual products is about the same?

Witness: Possibly it may be, but it does not bear any relation to the cost of coal.

Mr. RODWELL: Can you account for the difference in the value of the residual products in 1866 being greater than the value in 1865 in the case of the Imperial Company?

Witness: Certainly not; I know nothing about that.

Re-examined by Mr. HOPE SCOTT: If more coal was used that might suggest a reason. We produce something like eight sacks from a ton of Welsh cannel. I estimate the value of it at perhaps 6s. at the outside. We generally make our contract for 2000 tons of Welsh cannel. I believe that cannel is not used anywhere else in London for gas purposes. We buy it from an agent in London. I believe its maximum illuminating power is 21 candles. I have tested it for illuminating power by itself, and mixed with other coal in the ordinary manufacture.

Mr. HOPE SCOTT: We have one or two witnesses, sir, to call on the coal question; if you will allow us to take them now, I will examine them very shortly.

The CHAIRMAN: Certainly.

Geo. Elliott, Esq., examined by Mr. HOPE SCOTT.

I know the cannel coal district. The gas from Wigan cannel varies in its illuminating power; but generally, perhaps, there is less difference in the properties there than in other parts of the country. I consider that the proportion of cannel coal raised in England is not more, or but little more, than 1 or 1½ per cent. of the entire product of coal, taking the United Kingdom.

Mr. HOPE SCOTT: I believe you have had particular means of knowing from having been on the Royal Commission appointed to inquire into the subject?

Witness: Yes; that is a part of the subject with which we are particularly engaged upon the commission.

Examination continued: I think there is perhaps a fourth, or something like 20 per cent. used for oil-making. I have some cannel in some of my collieries in Durham, but it is not a very large quantity. It would not be a quarter per cent. upon the whole product of Durham. I have also a colliery in Wales, in which there is cannel. The per centage it bears to the

general yield of Wales is almost infinitesimal. The other coal seams there are very thick; they pervade over a very great district.

Mr. RODWELL: I do not know, sir, how far my learned friend is at liberty to go into the question as to the supply of cannel. My learned friend generally does not put questions without a point.

Mr. HOPE SCOTT: What is there in the question? Perhaps the short-hand writer will be good enough to read it.

The last question and answer were read.

Mr. RODWELL: I do not object to the question; but the question is, how far my learned friend is to go.

The CHAIRMAN: I think you quite understand, on both sides, what has been already said; that the committee will take facts as to the actual price and supply of coal and cannel, but that they will not enter into a speculative inquiry as to the future—it is not the question referred to us.

Mr. RODWELL: That is all I wish for, sir. I have nothing to ask the witness.

Mr. RICHARDS: I have a witness here, sir, who is a large coalowner in the north of England. He comes to speak to the gradual rise in the price of coal which has taken place, and which he anticipates will continue to take place.

The CHAIRMAN: We shall adhere to our rule, and I shall stop the first question which appears to me to transgress it.

Mr. *Wm. Stobart*, examined by Mr. RICHARDS.

I am managing owner of the Wearmouth Colliery, in Durham. We supply considerable quantities of gas coal to the London markets. The price of gas coal has risen of late, and, in my opinion, is likely to continue to rise.

Mr. RODWELL said he had no question to put to the witness.

Mr. *G. T. Halls*, examined by Mr. HOPE SCOTT.

I have been engineer and manager of the Salford Corporation Gas-Works for rather over eight years. I have had experience in the manufacture of gas, both of high and low illuminating power. Salford gas averages 20 candles. It has been tested by Dr. Angus Smith. He used a No. 3 jet burner—a fishtail. We use about one-seventh of coal, mixed with cannel, in the summer time, and frequently in the winter we discontinue using common coal altogether. About four-fifths of the cannel are Wigan cannel, and the remainder from the neighbourhood of Wigan. The average illuminating power at the works is about 21 candles, in order to ensure 20 candles in the town; but at times we are below that considerably. When cannel is used alone it yields, on an average, about 10,500 feet to a ton, of about 22-candle gas. The common coal that we use yields about 9000 cubic feet per ton. It comes from a place called Halton, about nine miles from Salford; it is Lancashire coal. Its illuminating power is 12 candles. I have read the evidence of Mr. Heron, and have tried the mixture there mentioned. The result was from 15 to 16 candle gas. I tried to get as much as I could out of it. I have read the evidence of Mr. Cleminshaw, where he says—"One-half of Wigan cannel and one-half of Newcastle coal will produce 19½-candle gas." I do not think it could be done. I have no means of knowing exactly what the Manchester gas does produce in illuminating power when it is tested. The cost of cannel in our works is 15s. 1d. at one station, and 15s. 11d. at the other; making a difference of 10d., according to the place of delivery. That is under a contract made two years ago. On the Wigan cannel that is an advance of 2s. on the previous contract, and on the Halton cannel it is an advance of 3s. The common coal costs us 11s. 9d. a ton delivered. It is a contract of 12 months standing. We never contracted for coal before, as we use but a small quantity.

Mr. HOPE SCOTT: Mr. Cleminshaw seems to have thought that the carriage of coal to London and Manchester was about the same. How much of the prices you have given are due for the conveyance from the pit to the company's works?

Witness: By the old London and North-Western line it was 1s. 10d., but since the opening of the new line it is 1s. 7d. a ton. I speak now of cannel, but I believe the rate is the same for cannel and for coal.

Examination continued: I do not know the charge for taking it to London; one is about 200 miles and the other 19. We have used the coal we at present mix with the cannel about 18 months. Before that we used all cannel, raised by the Wigan Coal and Iron Company. The reason we changed our plan was the upward tendency in the price of cannel, and the difficulty of getting it. We contract for a three years supply. Even with that we have great difficulty in getting it. Last winter and before that we were frequently so low as to have only six hours supply. I have been to Wigan repeatedly, and they have told me I must take my chance with the rest; that many were in a worse position than I was, and that they had large orders on hand.

Mr. HOPE SCOTT: Do you believe that the output is wilfully restricted, or that it arises from difficulties which they have with the miners?

Witness: I believe that they were over ordered—over contracted.

Examination continued: We were in that position for two years running. We were better off before, but I can remember one case in which we were short in a severe frost, six years ago.

Mr. HOPE SCOTT: Until within the last two years you had no difficulty in getting cannel, and enough to make gas for your whole consumption, but within the last two years you have had both a rise in price and a great difficulty in getting cannel?

Witness: Yes.

Examination continued: Our leakage has been 12 per cent. on an average of three years. That is the difference between the gas made and the gas sold. The gas-works of the Salford Corporation were established 30 years ago, I should think. The greatest portion of our unaccounted-for gas arises, I think, from condensation. The greatest distance that the gas travels in a straight line is about 9½ miles.

Mr. HOPE SCOTT: Now, as to the cost of manufacture at Salford; taking your 20-candle gas, on the average, of course, how much is it for cannel, and how much for coal?

Witness: The average is about 1s. 4½d. per 1000 feet.

Mr. HOPE SCOTT: Including what you use for carbonizing the fuel?

Witness: Yes; that is, on the gas sold. Our products, per 1000 feet of gas sold, amount to about 6½d.

Mr. HOPE SCOTT: Making, as far as fuel is concerned, the deductions of those products, if I understand you rightly, 10½d.?

Witness: Yes. Manufacture and management, 1s. 1½d.; depreciation, 3d.; making a total of 2s. 2¾d.

Mr. HOPE SCOTT: How do you manage that in the Salford accounts? Is that charge an annual charge for depreciation?

Witness: We are allowed by the Act of 1862, to set by any sum not exceeding 3 per cent., and that we regularly do. We have a sinking-fund; we put by 1-40th to that.

Mr. HOPE SCOTT: One-fourtieth of what?

Witness: I should explain that the capital must be paid off in 40 years—the original capital.

Mr. HOPE SCOTT: What was the original capital?

Witness: I cannot say; we were borrowing and reborrowing.

The CHAIRMAN: If you will say what was paid off last year, that will give it us.

Witness: At the present time the capital is about £150,000 actually employed.

Mr. HOPE SCOTT: You have nothing to show what that capital was originally, and how it has been dealt with since?

Witness: No.

Mr. HOPE SCOTT: Is there anything in the Salford management which attributes to any given amount of capital the dividends?

Witness: No; money is borrowed in the market at a certain rate per cent.

Mr. HOPE SCOTT: Nothing is charged except what is necessary to pay the interest, and the actual expenditure, to the sinking-fund, and for depreciation?

Witness: Yes; the whole balance of profit goes to the town.

By the COMMITTEE: £8340 1s. 1d. was the profit last year, which was divided among the districts.

Mr. HOPE SCOTT: Treating the districts like shareholders.

Witness: Yes. There are three districts—Salford proper, Pendleton, and Broughton. Upon the union of those districts certain proportions were settled.

Mr. HOPE SCOTT: What is the rate paid upon your bonds?

Witness: Their present average is from 4½ to 4¾.

Mr. HOPE SCOTT: We can get the original capital, I think, from the sinking-fund. What is the figure given for the sinking-fund?

Witness: We cannot get at that. Salford township proper has an annuity of £2500, which represents £50,000 a year.

Mr. HOPE SCOTT: Settled upon its marriage with the other townships.

Witness: Settled on Salford proper.

By the COMMITTEE: The depreciation-fund is between £4500 and £5000. I cannot say at present what we have carried to the credit of the sinking-fund; we have been borrowing a large quantity of money lately. The accounts are published in Salford, and are matters of public interest.

Mr. HOPE SCOTT: What we want is not in the account.

Witness: No, it is not.

The CHAIRMAN: You know, I think, what we want, to enable us to make the calculation from afterwards.

Mr. HOPE SCOTT: And I want it myself.

Witness: There is no difficulty in getting it.

Examination continued: Our price for gas is 3s. 4d. within the borough, and we sell 207,335,175 cubic feet. Within a radius of 5 miles it is a 4s. rate, and we sell 24,214,116 cubic feet; and beyond that it is 4s. 8d., and we sell 2,375,589 cubic feet. The charge for the supply of lamps in the borough, consuming 2½ feet per hour, is 3s. per 1000 feet, and they consume 17,772,333 feet. I am giving the figures to the month of June. For lamps outside the borough we charge 4s., and the consumption is 1,372,700 feet. Their consumption is variable—2½ and 3 feet. At Salford, the contract price of our retorts now is about 3s. per lineal foot; we have had them as low as 2s. 10d. I think the price in London runs from 4s. 6d. to 5s. 6d. Fire-bricks at Salford cost 60s. and 65s. per 1000, laid down in the yard. I am not in a position to say what they cost in London; I am told from 75s. to £5. The fire-bricks are within 6 miles of Salford, and the materials for the retorts are within a radius of 17 or 18 miles. I do not find that the price of coke rises with the price of gas coal.

Mr. HOPE SCOTT: Does it vary with other kinds of coal?

Witness: What affects the coke with us is the rise in the price of household coal; if that goes up, then the price of coke goes up.

Mr. HOPE SCOTT: Do the other residual products rise in proportion to the price of coal?

Witness: All our residual products are falling very rapidly indeed. Tar was 32s., it is now 19s. 6d; ammoniacal liquor has fallen 50 per cent.

Mr. HOPE SCOTT: I suppose your residual products have a direct reference to the manufacturing processes carried on at Salford?

Witness: Yes; they are all manufactured within a radius of four or five miles from the works.

Mr. HOPE SCOTT: Such a thing as a new dye may affect very much the price of your residual products?

Witness: That is what affected the price of tar. From the aniline dye not standing it sent tar down in the market wonderfully. The price of coke is now 10s. a ton. The extreme points of fluctuation are from 8s. to 10s. I never knew it over 10s.

Cross-examined by Mr. WEBSTER: Coke is now at it maximum price. I have practised as a gas engineer for 15 or 16 years. My first appointment was at Bridgewater, in Somersetshire. The total quantity of coal carbonised in Salford in the year ending June last was 26,350 tons 14 cwts. 2 qrs. There is a small quantity of coal there—not one-seventh. It was carbonized at an average of 2s. 2¾d. The total cost, delivered at the works, was £17,312 15s 11d. We received for residual products £6619 19s 5d. The gas made was 289,356,000 feet, as registered at the station-meter. Of that quantity, 253,069,913 feet were sold; consumed at the two stations, 1,748,100; supplied gratuitously to Trinity Church clock, 230,700; St. Philips's, 369,700; St. Thomas's, 193,900.

Mr. HOPE SCOTT: Have you any distinct figures for escape?

Witness: The difference between what we can account for and what we sell is 12 per cent.

By Mr. WEBSTER: The total charge for manufacture in the revenue account is £31,173 14s 4d.

Mr. WEBSTER: Can you tell me the cost of manufacture as distinguished from the cost of the raw material, deducting the cost of the raw material and the cost of management?

Witness: I cannot; it is altogether here. It could be done by working them out.

Re-examined by Mr. HOPE SCOTT: The item of "1,748,100 feet consumed at works" is included in the 12½ per cent. We have a meter at both of the stations to register the quantity we consume on the works.

W. Odling, Esq., examined by Mr. RICHARDS.

I am a Fellow of the Royal Society, and professor of chemistry and lecturer on chemistry at St. Bartholomew's Hospital. I have for some time had considerable experience in testing the illuminating power of gas. I have tested in some cases on behalf of companies, and on other occasions for local authorities. I went to Manchester with Mr. Wood, engineer to the Hastings Gas Company, and Mr. Sugg, gas apparatus engineer, and made a careful examination of the illuminating power of the gas supplied there on Thursday and Friday last, the 29th and 30th of May. I made twelve experiments, each of them consisting of twelve observations. I have the details here of every experiment. I employed the ordinary disc photometer; sometimes the form of instrument arranged by Dr. Letheby, and sometimes the form arranged by Mr. Evans, and which are commonly known as Letheby's photometer and Evans's photometer. The burner was a bat's-wing such as

is ordinarily used in London for testing cannel gas—the same as defined in the Metropolis Gas Act. Here it is [producing the same]. The mean of all the twelve experiments gave an illuminating power of 18·38 sperm candles, burning at the rate of 120 grains per hour.

Mr. RICHARDS: I will call your attention to an answer given by Mr Joseph Heron. The chairman says: "The power at Manchester is 21 sperm candles, is it not?" to which the answer is "Yes." And also in Mr. Clemmshaw's examination, Mr. Grove says: "What is the illuminating power? Is it the same in both places?" to which the answer is, "Liverpool supplies cannel gas, I should say, at the same illuminating power as Manchester." "What is that?" "Manchester is from 22 to 23 candles." That does not answer to your experiments?

Witness: No; we found that the mean of the twelve experiments was 18·38 candles.

Examination continued: The testings were made at the house of a surgeon in Stretford Road, from half to three-quarters of a mile from the works. They were made with every care and precaution. I have been engaged in such inquiries at different times, and I have taken part in such experiments. I have not formed any opinion as to the possibility of supplying London with 18-candle gas.

Mr. RICHARDS: I believe I may take it that the results varied from 19·71 the highest, to 16·19?

Witness: 16·70; there is a slight inaccuracy there. The first experiment was made at half-past eight in the evening, and they were continued through the night and the next day, and the 16·70, the lowest, was at eleven the following night. There are one or two slight errors in the second place of the decimals.

Cross-examined by Mr. O'MALLEY: During a part of the time the surgeon in whose house the experiments were made and his partner were present, but they took no part in the examinations. No notice was given to any one down there to attend to check our experiments. The principle of all photometers is the same, but there is some little difference in the mechanical construction. The two forms most commonly used are Dr. Letheby's and Mr. Evans's. I have not got a photometer here, but I have the discs. The beam in Dr. Letheby's photometer was 60 inches; in Mr. Evans's there is no beam, but the length of the photometer, was, I believe, 50 inches. When they are fixtures they are made to 100 inches, but when they are moveable they are made shorter.

Mr. O'MALLEY: In testing-houses they are usually made so, are they not?

Witness: I should say that the ordinary form of Mr. Evans's photometer is 100 inches, but the invariable form of Dr. Letheby's is 60 inches, and that is the most used.

Mr. O'MALLEY: What 'is the pattern of their burner, or is there any burner deposited in any place, that you took it from?

Witness: I do not know; but, so far as I can remember, in the Metropolis Gas Act it is described to be a bat's-wing or fishtail. I think they both allow of burning 5 cubic feet an hour. In Mr. Evans's photometer the lights were enclosed; in Dr. Letheby's they were exposed to the air. I am not aware that chemists have entertained a strong objection to a photometer with enclosed lights. I do not think Dr. Leeson has made any photometrical experiments for the last twenty years.

Mr. O'MALLEY: Do you know he has not done so?

Witness: I think I may say I have that knowledge; I do not mean to say I know it as a positive fact. I cannot say, in the case where the box was used, how far the candle was removed from the side; in the other case about 4 inches.

Mr. O'MALLEY: Are you aware that Mr. William Thomas Brand, Mr. John Thomas Cooper, Dr. Leeson, and Mr. Thomas Graham, all recommend that the flame of the gas or candle should not be less than 5 feet removed from the side of a darkened chamber?

Witness: I am quite aware of that, but those are experiments not made in a box at all, but in a room.

Mr. O'MALLEY: The side of your box has a reflecting surface to a certain extent, has it not, when you use it?

Witness: I suppose that one cannot say that the whole of the light is absorbed; a minute portion is reflected.

Mr O'MALLEY: It is a reflecting surface in the room where you use it; the wall is a reflecting surface?

Witness: I beg pardon; those experiments were made some years ago, when the photometer was first introduced. Mr. Graham, Mr. Cooper, and Mr. Brand made the experiments simply in a room, and they recommended that the candle should not be stuck too close to the wall. The experiments to which objection is taken are made in a box, and means are taken to prevent reflection.

The following report was handed in:—

Report of the Testings of Illuminating Power of the Gas at Manchester, by Dr. Odling, Mr. Wood, and Mr. Sugg.

Number of Experiments.	Date.	Time.	Instrument Employed.	Grains of Sperm Candles consumed in Ten Minutes.	Results.
1	May 29, 1867.	8.30 p.m.	Letheby.	38·75	19·71
2	Ditto.	9.15 p.m.	Evans.	40·03	19·54
3	Ditto.	11.0 p.m.	Do.	40·02	18·35
4	Ditto.	11.30 p.m.	Letheby.	39·25	18·20
5	May 30, 1867.	12.30 noon.	Evans.	41·25	18·15
6	Ditto.	1.0 p.m.	Do.	39·75	18·08
7	Ditto.	3.0 p.m.	Do.	45·00	18·00
8	Ditto.	5.30 p.m.	Do.	39·50	18·46
9	Ditto.	6.0 p.m.	Do.	40·00	19·00
10	Ditto.	7.45 p.m.	Do.	42·50	18·48
11	Ditto.	9.45 p.m.	Do.	41·50	17·94
12	Ditto.	11.0 p.m.	Do.	40·25	16·69
			Total		220·60
		(Number of experiments, 12.)	Average .		18·38

Twelve Experiments.

Highest	19·71
Lowest	16·70
Average	18·38

Mr. *Alfred Wood*, examined by Mr. RICHARDS.

I accompanied Dr. Odling and Mr. Sugg to Manchester on the days mentioned, and was present during the whole of the experiments. I have heard the evidence of Dr. Odling, and corroborate the evidence he has given. I agree with him that the testings were fairly and properly made. Nothing could be more delicate.

Cross-examined by Mr. WEBSTER: I have never examined the Manchester gas at any previous time.

Mr. *W. T. Sugg*, examined by Mr. RICHARDS.

I have been a manufacturer of gas apparatus, burners, and so forth, for some time. I went with Dr. Odling and Mr. Wood to Manchester, on the 29th and 30th of last May. I was present during the time when all the experiments were made. As a maker of gas apparatus, I have frequently been present at the testing of gas. I corroborate Dr. Odling as to the result of those testings. Those testings were made with all possible care and accuracy; they were the best possible tests that could be made. In the case of this particular testing the candles burned very nearly 120 grains every time; it is an exceptional case, for I happen to have had a set of candles which came very nearly to the parliamentary standard, and it is but rarely that they do. The burner we used was the same as the one with which the gas supplied to the Houses of Parliament is tested, and generally the cannel gas that is supplied throughout London.

Cross-examined by Mr. O'MALLEY: It would have been impossible to have tested the illuminating power of our candles before going to Manchester, because, if we had burned the candles, we could not have used them there.

Mr. O'MALLEY: You might have used a portion of them for testing their illuminating power in one place, and then afterwards used the other portion of them for testing the illuminating power of the gas.

Witness: We did not do so. In this case we got the best sperm candles, and we burned those candles, and they consumed as nearly as possible in every instance 120 grains per hour. We tested them in the photometer at the time we performed the experiments, and the candles were weighed every time, as they should be. Dr. Odling has an account of the weights. Supposing a candle to be mixed with paraffin, that would increase its illuminating power, and therefore it would be against the gas. If it were mixed with wax, it would also increase its illuminating power; but on the present occasion the candles were true sperm candles, neither mixed with wax nor paraffin.

Mr. RICHARDS: In your opinion, were the testings fairly made?

Witness: Yes; they could not have been better made, because the candles burnt so accurately.

By Mr. O'MALLEY: I am the maker of Sugg's steatite burners. In a 14-candle burner the diameter of the central burner would be ·48 inch; but it varies according to the illuminating power of the gas, and what the burner has to do. I believe for 12-candle gas it would be ·42 inch, but I am only speaking from memory.

Mr. RICHARDS: These questions do not refer to the bat's-wing burner.

The CHAIRMAN (to Mr. O'Malley): I understand you to think that the answers to the questions will illustrate whether the experiments have been properly made?

Mr. O'MALLEY: I do not know that.

Witness: The questions that the learned counsel now puts will not clear up this question at all. The burner is put in and deposited that we use; it is a bat's-wing burner. The Argand burner is to test common gas; now we do not use a bat's-wing burner to test common gas.

Mr. O'MALLEY: What is the difference between the burner that was originally in use in 1860 and what is called Sugg's improved burner?

Witness: If you ask me questions without having my papers I cannot answer them. I come here to speak to the Manchester gas only. I should be prepared on another occasion to speak to the question of burners.

Mr. O'MALLEY: As you are a manufacturer I would rather have it now, when you are not prepared.

Witness: There is no difference at all.

Mr. O'MALLEY: Is there no improvement by the fact of its being a steatite one?

Witness: I put into an old 15-hole burner a steatite top, and therefore there can be no difference at all; it is the same burner. There is a steatite top instead of an iron one, but the results in illuminating power are identical.

Mr. O'MALLEY: Will you venture to say it is the same in structure? Look at the two things, and will you say that the interior aperture is the same in both? [Handing a sketch to witness.]

Witness: I see an orifice marked here 576·75; and if this has been measured from a real burner it is not a 15-hole burner at all, I should say.

Mr. O'MALLEY: Was the internal opening represented by that sort of disc on the sketch the same in yours as in the one that was in general use in 1860?

Witness: The burners must be the same, because a 15-hole burner was taken, and a steatite top put into it; therefore it must be the same.

Mr. O'MALLEY: Am I to understand you to say that you construct your burners now by taking the old burner of 1860, and putting a top in?

Witness: No.

Mr. O'MALLEY: Has the new burner the same internal opening and the same diameter as those which were in general use in 1860?

Witness: The new burner is the same size.

The CHAIRMAN: You have been asked whether the burner, which it appears goes by your name, is the same burner that was in use when the Act of 1860 was passed, and whether your improvements consisted in putting in a material that was durable in lieu of a material that was not?

Witness: Yes; exactly so. That was the improvement, and the only one.

Mr. O'MALLEY: Am I right in saying that in the old burner the holes are larger, but the internal diameter is smaller? Is that correct or not?

Witness: You are speaking of a mythical burner, while I am speaking of a real burner. It is possible to make a burner with any sized holes you please in it, and therefore it is impossible for me to say whether there is a difference in the size of the holes, because you may present a burner with any sized holes you like.

Mr. O'MALLEY: Is it right to say that in the old burner the holes are larger, but the internal diameter of the burner is smaller?

Witness: I do not know about that at all, and therefore cannot say whether it is so or not.

Mr. O'MALLEY: When you were speaking about the burners, did you not make a distinction between a photometrical burner and the other?

Witness: These burners are photometrical burners. I do not know that there is any difference between a photometrical burner and an ordinary burner.

Mr. O'MALLEY: In the photometrical burner that was used in 1860 and the photometrical burner that is now used, do you mean to say that the internal orifice is the same?

Witness: When you speak of the photometrical burner that was used in 1860, I cannot tell what you mean. If you will give me the dimensions of the burners I will answer you. I can give you the measurements of my burners, but not at the present moment. I only speak from memory now.

Mr. O'Malley: Then, according to your remembrance, what are they?

Witness: I prefer not to answer the question.

Mr. Richards: Am I right in saying that the new burners have not corroded, and that the burner that was made before 1860 was, when new and uncorroded, equal to yours?

Witness: Undoubtedly.

Mr. Richards: Assuming your burner to be anything better than any other burner, the Manchester gas, which turned out to be 18·38, had an advantage?

Witness: If my burner was the best, undoubtedly it had the advantage. Otherwise it would have turned out worse than 18·38.

Ninth Day—Thursday, June 6.

S. Barber, Esq., examined by Mr. Michael.

I am solicitor and secretary to the Western Gas Company, and have been so for nearly 19 years. I acted as solicitor for the five companies who made the districting arrangements in 1857—viz., the Imperial, the London, the Equitable, the Western, and the Chartered. I prepared the deed of arrangement between the companies. The transfer of districts dated from July 1, 1857. It was a very complicated question, and the difficulty was to do justice to all the companies and the public. The negotiations lasted for 18 months, and ultimately we came to the arrangement that was laid before the committee in 1858. This map [producing the same] will give some notion of how London was lighted by the companies previous to the districting arrangement. Each colour represents a separate company, showing two, three, or four companies in every district. Each company took up one separate district under the districting arrangements, which was a great advantage to the public as well as to the companies. The object of the districting was to see if the companies could not increase their dividends without any increase of price. They were paying low dividends at the time, and had done so for many years; therefore it was absolutely necessary to raise the price of gas, or to come to this arrangement, and, by reducing the expenses, get the same profit in that form. We tried to make the various districts as convenient to supply as possible, and that object was fairly carried out. Before the districting, we laid our mains out as far as Leicester Square and Cranbourne Street; we lighted the Great Globe and the Panopticon. We extended to the South almost down to the river—to the Commercial Road; we had all the public lamps in Belgravia, and a very difficult district it was to light. To the west we went much the same as we do now; and to the north we were lighting at Kilburn. The result of the districting, as far as our company was concerned, was, as shown to the committee in 1858, that we withdraw our mains from those parts that were the farthest from our works, and shrank into the compass shown by the blue line on the map which I now put in [handing it in]. A similar course was taken by other companies.

Mr. Michael: Referring to some of the evils that you got rid of by the districting, first, where there were parallel mains, was it very difficult to distinguish the mains of one company from those of another?

Witness: Yes; we often found that supplies were taken from the wrong mains.

The Chairman asked to what point this examination was tending.

Mr. Michael said that as the Western differed from other companies in supplying only cannel gas, his examination would be directed to the question of cannel; but that he thought it right to take from this witness such evidence upon the subject of the districting as he alone could give, having been solicitor to the united companies before the Act of 1860.

Examination continued: The districting deed, which was not put in before the former committee, recites the following evils:—"1st. Where there are parallel mains, it is difficult to distinguish the mains of one company from those of another; by reason thereof supplies are taken from the wrong mains, and litigation is occasioned thereby. 2nd. The quantity of gas that escapes by leakage is increased. 3rd. The increased leakage occasions increased loss to the companies, and greater contamination of the surrounding soil, and even water in the mains for the supply of water, and greater risk of explosions and other evils, by the escape of gas into cellars and the underground parts of neighbouring houses, and into the mains of the telegraph companies. 4th. It is difficult to ascertain from which company's main the leakage takes place, and therefore to which company notices to repair the mains whence the leakage takes place ought to be given. 5th. The breaking up of streets for laying, repairing, and renewing gas-mains is frequent; and 6th. There is greater injury to the gas-mains by reason of the breaking up of streets for purposes connected with water supply and sewerage." Those evils were, for the most part, put an end to by the districting arrangements. Then there is a clause agreeing not to compete with one another, and then follows:—"Provided always, that inasmuch as it is not the intention of these presents, in conferring on the five companies the exclusive possession of their respective districts, to enable any of them to raise the price of gas to consumers above the maximum charge fixed by Parliament, on their last investigation of the supply of gas, by a metropolitan gas company; and inasmuch also as the maximum charge so fixed is legally binding only on the Imperial, therefore no company shall be entitled to insist on the observance in their favour of article 25, except while they are supplying gas in their district at a price not exceeding the price sanctioned, and of a quality at least equal to the quality required by the Imperial Gas Act, 1854; in the case of the gas known as cannel gas, at a price not exceeding one-third more than the price sanctioned, and of a quality exceeding by at least one-third the quality required by that Act." As the result of that districting the surplus mains were removed, as far as practicable, by every company.

Mr. Michael: I suppose that you heard the evidence of Mr. Cleminshaw, with regard to the surplus mains still existing in the public ways; is that the fact with regard to your company?

Witness: No; we took up every main that was worth taking up. There are no mains in our district which are reservoirs for gas, and not used to supply mains.

Mr. Michael: What do you think of what Mr. Cleminshaw said with regard to Regent Street?

Witness: So far from there being surplus mains in Regent Street, my company had to lay an additional main the year before last. That was the case also in Piccadilly, in consequence of the increase of business.

Mr. Michael; By any of these arrangements, was the price of gas raised?

Witness: No; it would have been contrary to the idea of the companies; there was no raising of the price except where there had been unfair contracts below a remunerative figure, and there the companies put the vestries and consumers who had been getting it too cheap all one basis, and of course that increases the profits considerably; every man had to pay the same as his neighbour, whereas before unfair consumers had been accustomed to play off one company against the other. The Western Company has faithfully discharged the obligations imposed upon them by the Act of Parliament.

Mr. Michael; What was the result of the Act so far as your back dividends were concerned? What amount of back dividend have you unpaid?

The Chairman: I understand we are to have a printed return which will show us the exact state of the facts with respect to all the companies.

Mr. Richards: I think the information will be found in the returns which I handed in this morning.

Mr. Michael: The table will hardly give you in this form the amount of the back dividend.

The Chairman: There is no conceivable use in having from the witness what we shall have in a tabular form.

Witness: We lost £100,000 of back dividends, and I do not think that you have got that fact.

Examination resumed: If we had made up all our back dividends to 10 per cent. we should have paid £135,000. Since the passing of the Act we have paid £32,000, and consequently we have lost £103,000. Our present price is 5s. 6d. for 20-candle gas as the minimum; it is practically 21½ on an average. We are now paying 10 per cent. We were limited by the Act of Parliament as well as the other companies. We had no limit previously to that. Previous to Lady-day, 1865, when we made the reduction, our price was 6s. What led to the reduction was simply the desire of the directors to sell their gas as cheap as any other company in London. There was no agitation at all before we announced our intention of reducing our price. Our principal contracts for cannel coal in the last year or two have been calculated at 21s. 4d.; for Wigan cannel, 22s. 6d. and 23s. I am sorry to say that since we reduced the price there has been a great change in the charge for cannel. It is now 26s. We have bought it at that price. We lately tried to get it at a less price and failed.

Mr. Michael: Will you give me the particulars of the different cannels which you use? Are you forced to use any Scotch cannel with the Wigan, in order to keep up your illuminating power?

Witness: We generally keep a little first-class cannel in stock for the winter to provide for sudden frost, or the going down of the illuminating power by inferior deliveries of other coal; the coal coming in bad condition will sometimes lower the illuminating power suddenly, and we are forced to put a little stronger stuff to it.

Examination continued: At the end of the last financial year, we had supplied 303,183,000 feet to private consumers, and public lamps 35,105,000, making a total of 338,228,000 feet. We used 39,657 tons of coal in all, consisting of Boghead, 415 tons; Lesmahago, 402 tons; Rigside, 1065 tons; Wigan, altogether, 37,231 tons, consisting of Rosebridge, 13,479, and Kirkless, 23,752 tons. There was a slight mixture of Newcastle coal, 544 tons. They come out in this per centage:—Boghead, 1 per cent.; Lesmahago, 1 per cent.; Rigside, 2·7 per cent.; Wigan, 93·9 per cent.; and Newcastle, 1·4 per cent. The yield per ton was 8530 feet per ton for sale. The total make per ton was 10,337 feet. The leakage was 17 per cent., being cannel gas. With regard to our receipts, first, the gas-rental per 1000 feet of gas sold, amounted to 67·17d. To get to the clear result of the making of the gas only, I have deducted, for convenience sake, the lighting and repairing of lamps, 1·35d.; bad debts, ·36d.; making together, 1·71d.; so that I get 65·46d., the nominal price being 5s. 6d. per 1000 cubic feet; the sale of old material being ·02, making the total receipts, exclusive of products and rental from meters, 65·48d. As regards the expenditure in manufacture, the price of coal is 32·75d. We deduct 8d. for the products, making the net cost of coal, less the products, 24·75d. The cost of manufacture, exclusive of the price of coal, is 11·84d., making the total cost 36·59d. The distribution costs 1·63d., and the cost of management is 4·17d. There are also some law and parliamentary charges, and redemption to add, making the total cost 42·97d. The profits on gas are then 22·51d. Deducting the meter-rental profit from that leaves 23·66d. per 1000 feet sold as the aggregate profit. The interest on our borrowed capital requires 1·56d.; and our 10 per cent. dividend, 20·70d. That left us with a balance for the reserved-fund of 1·40; not entirely out of the gas, because the profits on the meter rental came to 1·15d., therefore there was ·25d. left for the profit on the gas. Our capital was then £345,000 odd. The share capital was £300,000.

Mr. Michael: Were those calculations made on the cost of manufacture before the rise?

Witness: It does not show the present state of things. With the present price of coal—26s.—it would work out to 36·70d., instead of 32·75d. That is an increase of about 4d., and the products would be about the same.

Mr. Michael: You have something to add for cost of labour, and lime for further purification?

Witness: Yes; we have been desirous of adopting every improvement; and as so much was said about lime as against oxide of iron last year, we have put up a purifier for lime, and that is costing us something considerable. That would cost 1¼d. or 1·25d. extra per 1000 feet, making the total extra expense 5·20d. That will bring down our dividend, I fear, to about £7 10s. per cent. if we continue our present charge of 5s. 6d. An increase of 10d. per ton in the price of coal adds 1d. per 1000 to the cost of gas, taking 10,000 feet to the ton. We have a good market for coke owing to our situation, and though it is cannel coke we get 10s. 3¼d. on the average per chaldron. This is because we have practically the monopoly of supply in our district; the works at Fulham and Battle Bridge are nearest to us, and they are many miles off.

Mr. Michael: Do you find what was stated by Mr. Clift, that the price of coal does not materially affect the price of gas, is correct?

Witness: No; because we give more money for our cannel, people will not give us more for our coke.

Examination continued: I have made an abstract of the Acts of Parliament passed from 1856 to 1866. I find that there is one Act of Parliament with 9 candles, 23 with 10 candles, 4 with 11 candles, 40 with 12 candles, 7 with 13 candles, 68 with 14 candles, 4 with 15 candles, 6 with 16 candles, and 4 with 18 candles, including Wigan. Beyond that there are three Acts of Parliament; the Metropolis Gas Act with 12 and 20 candles; the Dewsbury Act with 12 and 20 candles, but they make no cannel gas; and the Liverpool Company which is 20-candle gas. Only one company pay as high as 26s. for their coals—the Inverness Company, which pays 26s. 6d. The price of gas there is 7s. 6d. I do not know the illuminating power, but it is high, because it is Scotch cannel.

Mr. Michael: Could you give me the price of gas in the towns mentioned by Mr. Hughes in his evidence? I am referring to Captain Gridlay's return.

Witness: Yes. Blackburn pays only 14s. for cannel; Bradford, 9s. 10d.; Derby, 9s. 8d.; Nottingham, 11s. 6d.; Preston, 12s.; Rochdale, 7s. 3d.; Sheffield, 8s. 8d.; and Stockport, 17s. 4d. That is a year or two, of course.

Mr. Michael: It has been stated by one of the witnesses, Mr. Beal, with regard to St. James's, that the lamps there burn 2½ feet per hour, and that if a proper burner were used, 1½ feet would be ample for their requirements.

Witness: I think he said they were supposed to burn 2½ feet, but we supply more than that. The burners are so constituted as to give a quarter more than the contract. That is one of our means of accounting for the gas that comes under the head of leakage. We give a large amount beyond the contract to keep on the safe side.

Mr. MICHAEL: Have the company been in communication with the vestries, and have they urged them to adopt a larger burner?

Witness: Yes; we have done so. We do not consider that the 2½ feet burner lights the streets properly; it brings disgrace on the parish and the company too.

The CHAIRMAN: I do not see where we are going to. The question of lighting a parish is a question for the parish authorities.

Mr. MICHAEL: You have had evidence that this company did not adequately light the parish.

The CHAIRMAN: But the witness says that they fulfil their contract, and that is quite sufficient.

Examination resumed: Our capital has increased £87,000 since June, 1860. We have made a return by order of this committee, and whatever the committee asked us for has been put in, but there have been so many returns that I cannot say offhand whether the item in reference to the increase was included.

Mr. MICHAEL: Has your capital increased or diminished in proportion to your rental?

Witness: It has gone down very much. In 1859 it was £478 per £100 of gas-rental.

The CHAIRMAN: When you come to address us, Mr. Michael, you will be able to make any comment you please, and found any argument you please on those variations between capital and gas-reutal; but we have got them before us in an authentic shape already. If you will point out to us anything which will show that we are usefully employing our time and the money of the parties, we will go at any length into the evidence; but to spend the time of the committee and the money of parties unnecessarily is not according to our wish.

Witness: Would you permit me to say that upon the evidence it appears that my company's capital comes out at a certain rate. According to Mr. Hughes——

Mr. MICHAEL: How many miles of main have you?

Witness: 107 miles in 83 miles of street, and 11,700 consumers.

Cross-examined by Mr. RODWELL: The additional capital has all been paid up and expended. Our chief expenditure has been upon a large retort-house. The whole of the money has been spent on absolutely necessary works.

Mr. RODWELL: You say that you have been deprived of your back dividends by the Act of 1860—that you have lost £103,000?

Witness: Yes.

Mr. RODWELL: The next best thing is to increase your share capital, and to spend as much money out of your capital as you can, I suppose?

Witness: It is very easy for you to draw your conclusions, but that is not so, because we have borrowed £12,000 from the bankers to pay the last dividend, and we owe them £9000 at the present moment.

Mr. RODWELL: Now, you say that the price of coals is 26s. When did the rise take place?

Witness: The 18th of May, in this year, is the date of our last order. We were practically paying the same price for coal in 1865 as in 1866; it works out to about the same.

Mr. RODWELL: In the manufacture of gas for 1866, the coals were £46,162, as against £38,137 in 1865. Will you take that from me?

Witness: I dare say that is so.

Mr. RODWELL: Is that £8000 simply owing to the increased quantity of coal bought, it being £38,000 in 1865 against £46,000 in 1866? Is that all owing to the increased quantity of coal?

Witness: To the increased business. The gas produced in 1866 was 10,337 feet per ton, and in the previous year 10,850 feet. I account for that increase in one year over the other by their being not exactly the same coals.

Mr. RODWELL: But my question is the gross quantity of gas in each year; give me 1865, for we have 1866.

Mr. LEFEVRE: Some of the gas was sold at 6s. per 1000, and that may make up the difference.

Mr. RODWELL: Yes; but I want the quantity.

Witness: The quantity made in 1865 was 667 million cubic feet.

Mr. RODWELL: You said the additional purification by lime necessarily involves an extra cost of about 1½d. Is the price of purifying by lime simply the same as it would be before the gas had gone through the process of purification by the oxide, or would it not be less?

Witness: I cannot say; the engineer will tell you that.

Mr. RODWELL: Is it the fact that in 1850 and 1851 you had to pull down and rebuild works to the amount of £80,000?

Witness: No.

Mr. MICHAEL: With regard to the coals, it may happen in one year that you may have much a larger stock than in another year, so that the quantity which you paid for in one year would hardly represent the quantity of gas that would remain?

Witness: No; we take that into account, and charge the account with the actual consumption. Another thing, the coals will vary in their producing power; some contracts are delivered better, and will work out better with the very same coal.

By the CHAIRMAN: When the districting took place we retired from some places, and the Imperial and the London, our neighbours, retired from the supply of other places. Some customers, who had been formerly supplied with cannel gas, had afterwards to be supplied with common gas, and other customers, who had been formerly supplied with common gas, had now to be supplied with cannel gas. With regard to whether there has been any dissatisfaction with the change, when we supply so many consumers, there are always some people who are dissatisfied. I cannot say what might be the effect in the case of a change from cannel to common gas, but in the case of my company taking the common gas consumers as against the cannel gas consumers there was no dissatisfaction.

The CHAIRMAN: Then I understand you to say that the consumer, so far as you know, is pleased with the change from the common gas at 4s. 6d. to your gas at 6s?

Witness: I should like to give you information on the subject, but it is a difficult question to answer. The public do not express their pleasure in that way when they are not consulted in the arrangement. I do not know that they seemed particularly pleased in our district, but I believe they are now quite satisfied.

The CHAIRMAN: I will put this question, then—Did your experience on the occasion of the change give, or has it subsequently given, you any means of judging whether the consumer is better pleased with the common gas at the one price than with the cannel gas at the other price?

Witness: No.

The CHAIRMAN: Am I then to take it that you were the solicitor for the five companies, and that under your direction this great change was made; that you have continued to be the principal manager of one of the companies from that time to the present; and that your experience enables you to give us no light at all upon the subject?

Witness: I can give you no reliable answer, I think.

By the COMMITTEE: Our capital is not all paid up; £300,000 is still to be raised. Our company is constituted under a joint-stock Act, and the Act of 1860 gave us our powers.

Mr. *L. W. Pritchard*, examined by Mr. MICHAEL.

I have been engineer to the Western Company for the last eight years. We supply 20-candle gas, but we generally work up to between 21 and 23 candles. Our last contract price for Rosebridge coal was 23s., and for Kirkless Hall 22s. 6d. Previous to this contract our price was 21s. 6d. We cannot get it at all at that price now. In January last, for a small portion of Rosebridge, we paid 25s. 0d.

The CHAIRMAN (to Mr. Webster): Do you dispute at all the price of cannel being 25s. 6d. or 26s.?

Mr. WEBSTER: No; we are aware that the price varies. The only matter which we dispute is the question of the inadequacy of the supply.

The CHAIRMAN: I only mention that because we were occupied, I think, twenty minutes in the examination of the last witness, and the committee are unanimously of opinion that everything we heard we knew before from the records that were in our hands.

Mr. WEBSTER: Although a good many questions were asked by my learned friend about cannel, I did not ask a question, because I considered that the committee had the facts before them.

Examination resumed: I have visited the cannel collieries in North Wales, but I could not get any cannel coal on better terms than those at present paid by our company. The minimum illuminating power that we get from the Wigan cannel depends on the condition. We get from the leading pits we have dealt with, such as the Ince Hall, Kirkless Hall, Rosebridge, and others, a minimum of 20 candles; the maximum I cannot give you.

Mr. MICHAEL: Supposing that all the companies are called upon to supply 18-candle gas, what is your estimate of the figure at which it could be done?

Witness: Exactly what I am now supplying the 20-candle minimum gas for. The rise in price would just give the difference in cost—4d. or 5d. per 1000. My estimate of the price which it would cost for the improved purification by lime is 1½d. per 1000. That is the practical result of the working. We use the best means in our power for producing the best gas. It cannot be produced at a less price. I have had an opportunity recently of examining cannel gas from various towns in the country, and I have found that, as far as the cost of production goes, we can compare successfully with the best.

Mr. MICHAEL: Now, with regard to burners, is it necessary that you should have a bat's-wing burner for the examination of your gas?

Witness: That is the burner which has been hitherto recognized. An ordinary Argand would not be suitable for testing the cannel gas. The reason is simply that we cannot burn the quantity through the Argand burner; you require a flat flame.

Mr. MICHAEL: Have you made any experiments to test the diminution if you burn a smaller quantity?

Witness: To bring it up to 20 by a smaller volume than 5 feet, I find a variation of from 7 to 15 per cent., burning various quantities under 5 feet. We commence at 3 feet and then go up as high as 3·8 feet, which is the highest quantity we can burn of cannel in a common gas-burner; that will not calculate up to the value.

The CHAIRMAN: Is all this to show that the same burner is not used for cannel and common gas?

Mr. MICHAEL: It is to show that the burner in schedule No. 2 is not suitable for testing cannel.

The CHAIRMAN: We have already agreed to postpone that until we come to the schedule.

Examination resumed: I have gone over Dr. Frankland's estimate for making cannel gas. Twenty cwt. of Newcastle coal, giving 10,000 feet at 15 candles, and working out to 150,000, is not correct. I take it as Mr. Hughes took it, at 9500 feet and 12 candles, which being worked out gives 114,000. Dr. Frankland takes 13·6 cwt. of cannel as giving 7500 feet and 22-candle gas, which works out to 165,000 cubic feet. That is taking the Wigan cannel yielding 11,029 feet per ton. I take the same quantity of Wigan cannel at the rate of 10,300 per ton.

By the CHAIRMAN: That gives 7004 feet and 22 candles as before; or per ton it gives 10,300 feet working out to 154,088.

Examination resumed: Adding Dr. Frankland's figures together, they come to 315,000; and adding mine together, they come to 268,088. Dividing Dr. Frankland's result by his volume gives 18-candle gas as the maximum; dividing mine gives 16·2. In working out the expenses, Dr. Frankland gives 20 cwt. of Newcastle coal at 15s. 3¼d.; I give it at 16s. Cannel he gives at 17s.; I give it at the rate of 26s. per ton, which is 17s. 8d. His total is £1 12s. 3¼d., as against mine of £1 13s. 8d. Dividing by the volume gives per 1000 feet 1s. 10d. for coal, against my 2s., or 24·49d. Dr. Frankland puts the expenses at 1s. 5¼d.; mine being 1s. 6·22d. The leakage Dr. Frankland gives at 12 per cent., which is equal to 4¼d.; mine is 15 per cent., or 5·25d. Dr. Frankland's total is 3s. 7¾d.; mine is 3s. 11·96d. Dr. Frankland gives the products, Newcastle coke, 7s. 4d.; my product—Newcastle coke, two-thirds of a chaldron—is 6s. Dr. Frankland gives the product cannel at 6s.; mine and breeze is 2s. Dr. Frankland gives tar and liquor at 3s. 6d.; mine is tar, 10 gallons, 10d.; 9 gallons, 13·5d.; and 21 gallons of liquor, 3·6d. Then Dr. Frankland's total is 11½d. products to be deducted, leaving a balance of 2s. 8½d., which taken from 3s. 6d. leaves 9¾d. per 1000 profit, which would be equal to a dividend of £6 3s. 1d. per cent. upon a capital of £6 6s. per ton of coal. My products come to 7·45d., leaving a cost of 40·51d., which taken from 3s. 6d. leaves 1·49d. profit, being equal to a dividend of under 1 per cent. upon the capital taken per ton of coal, realized from the manufacture of 16·2-candle gas instead of 18 candle. With regard to the deposit of hydrocarbons in our pipes, it is not the fact that 1000 yards is the limit at which they are deposited from cannel gas. We find what they call hydrocarbons about 6 miles from our works. We take the best methods for preventing those deposits. We are more liable to those deposits in cannel than in coal gas. We adopt the best known means for preventing our gas deteriorating in value on leaving the works.

Mr. MICHAEL: We have heard it stated that it is sent too hot into the pipes; that you do not take proper measures for cooling it. Is that true?

Witness: No; of course not. If the gas is not properly condensed it cannot be properly purified. No means are neglected in our works for giving the best supply to the public at the cheapest possible rate.

Cross-examined by Mr. WEBSTER: The price of our coal last year averaged 23s. 3½d. The residuals produced 5s. 8d. per ton, leaving 17s. 7d. as the cost of the coal. I have no doubt you are correct in saying that would be 10,379 feet at 1s. 9d. per 1000 feet, but it is a question of arithmetic.

Mr. WEBSTER: The cost of gas is 1s. 9d. per 1000 feet, though in the paper which you have signed you have put it at 2s. 2d. Look at page 16 of the correspondence, at that paper which bears your name, and which has 18-candle gas. The cost is 2s. 2d. there.

Witness: Yes.

Mr. WEBSTER: And yours is 20-candle gas, of which the cost appears to be 1s. 9d.?

Witness: Yes.

Cross-examination continued: Our capital per ton of coal carbonized is a little under £8 per ton—£7 8s.

Mr. WEBSTER: Your capital being £300,000, and the number of coals used in 1866 being 39,657 tons, it would be very nearly £10 capital on a ton of coal carbonized.

Mr. MICHAEL: I submit that this is a matter of calculation on the figures before the committee.

The CHAIRMAN: You are quite right to leave out everything that is matter of calculation on the figures before us, or which is matter of argument.

By Mr. RODWELL: I dare say our capital would be about that, but I have not gone into it. We sell the gas at per candle, just the same as the South Metropolitan, whose capital is £4 per ton of coal carbonized. Our capital is a good deal above the general average. I am not aware that that arises from any unusual expenditure on the works. There has been none in my time. Mr. Alexander Wright was once connected with the company. He did not reconstruct the works, they having been originally constructed by Mr. Palmer. He reconstructed a gasholder. It was one of 120 feet, of which the roof burst. The cost was £3000 or £4000, I think. That was in 1855 or 1856. We have no machinery for purifying gas by steam, nor did we ever have. We use now clay retorts, but previously used iron. The change began in 1853. I cannot say the cost, but it was less than the renewal of the iron would have been. The original retort-house did not require a different system of setting; but we did ultimately adopt a different setting. Very likely those alterations made an addition to the capital already sunk.

Mr. RODWELL: Now the last witness's attention was called to the increase of cost of manufacture. In June, 1865, it appears at page 342 of the Blue-Book of last year, and in the return put in the other day for 1866. Can you give any explanation of the increased cost of manufacture?

Witness: I do not know what returns have been given; the make per ton has decreased apparently; but you will understand that when the price of cannel was much lower than it is now, we used to have a liberal allowance of ingrain; that is to say, the colliery weight instead of the net weight; but since the coal has gone up in price the ingrain has got smaller by degrees.

By the CHAIRMAN: The nominal ton represented a larger quantity than it does now.

Cross-examination resumed: I do not find it to be the fact that the capital necessary to establish a cannel gas company is less than that of an ordinary coal gas company. The illuminating power is much greater, and cannel coal produces a larger quantity of gas. Cannel gas is dearer to manufacture than common gas.

Mr. RODWELL: Therefore, per ton, the extent of the works, and the capital required on the works, would be less?

Witness: If you divide it by the illuminating power it is so, but that is no test.

Mr. RODWELL: But looking at the increased illuminating power, and the increased quantity per ton, the capital necessary for establishing cannel works would be less than for establishing a coal gas company, would it not?

Witness: Theoretically, perhaps, it would, but in practice it is not so. It has not been found so in the Western Company, and I believe not in other companies.

Mr. RODWELL: But speak for the Western Company only—will you tell us whether a company starting afresh to manufacture cannel gas could not do with a less capital than a company starting for coal gas?

Witness: Probably that would be so if we were beginning afresh. We have the experience of the past to guide us; otherwise the world would not go on. Cannel gas costs more to purify than coal gas. It costs a higher price and requires a larger apparatus. Regard being had simply to the volume, the wear and tear is greater. You have more volatile matter to get out of a ton of coal, involving more fuel and larger furnaces. The difference in volume per ton from cannel and coal, the gas being carbonised at nearly the same temperature, is perhaps about 8 per cent.; therefore the furnaces and purifying apparatus would be larger, but the retorts and retort-house need not be. The purifier being increased 8 per cent. would not necessitate an increase in the cubic contents of the gasholder.

By Mr. WEBSTER: Whether common or coal gas is supplied makes no difference in the laying of the mains. I consider 12 candles as a fair average illuminating power of gas from a ton of Newcastle coal; ours is 20 candles. Our trunk mains are 24 inches, 18 inches, 12 inches, and 10 inches. The latter is the smallest trunk we have.

Mr. WEBSTER: If you have to light a district, seeing how much greater the illuminating power of cannel gas is, surely you need not have mains of the same size.

Witness: Theoretically, perhaps not; but I would make no difference, and never did make any difference.

Mr. WEBSTER: I suppose you mean that if you laid out works without regard to economy, you would make no difference.

Witness: No; I mean with regard to economy.

Cross-examination continued: I think the portion of capital due to pipeage generally is about one-third, speaking off-hand. I cannot say what it is in our own works. I cannot sever the cost of distribution from the cost of purifying and storeage.

By the COMMITTEE: There would be no economy in laying down mains for one particular sort of gas, as it might fail.

Re-examined by Mr. MICHAEL: There is economy in having large mains, for the leakage is diminished by diminishing the pressure. There is an extra expense incurred owing to the different heating power of cannel as compared with the Newcastle fuel. I have only one furnace to heat the retorts, but it is a large one, and it involves considerable extra cost compared with ordinary gas. We found it a very great improvement adopting clay retorts over iron retorts, and the cost price of the gas was much reduced in consequence. Renewals are not charged to capital. I have been asked a question with regard to the cost which I have given as an estimate of the 18-candle gas, and the actual cost of producing 20-candle gas. In the one case I have coal at 21s. 4d., and 20s., and in the other I have estimated it at 25s. and 26s. That accounts for the apparent difference; and besides that was an estimate for London generally. My working is better than that and my results are better, owing to local advantages. We get a good price for our coke. Other engineers give 5s. as the average, while I get 10s.

John Rofe, Esq., examined by Mr. MICHAEL.

I am a gas engineer, and have had great experience in the manufacture of cannel gas. According to my experience it requires nearly all cannel to make 20-candle gas. The picked cannel would make rather more. To send 20-candle gas into the pipes, it should in reality be made of a higher illuminating power. Cannel coal is charged with a larger quantity of hydrocarbons than common coal; they are deposited when the gas cools, and as it goes along the pipes it deposits those hydrocarbons, which of course decrease the illuminating power. Cannel coal fluctuates very much in different parts in regard to illuminating power—more so than ordinary coal. I have examined the state of the Western Gas-Works. In my opinion they are conducted in a satisfactory way. I do not consider that 17 per cent. for unaccounted for gas is excessive for cannel gas in a large district like that. I am not aware of any process which would prevent the deposit of hydrocarbons, nor do I believe that anything could be done to diminish it much. I have no doubt there is a loss of illuminating power, let the gas go as far as it will, because at the extreme end of the main, the meter will get to smell strongly of the hydrocarbons.

By the CHAIRMAN: I think a test at a distance of 1000 yards is a fair and practical test.

Cross-examined by Mr. WEBSTER: When I said that cannel varies more in quality with regard to illuminating power than ordinary coal, I spoke guardedly, because I have tried coal in various parts, and it varies materially. I am not speaking of Newcastle coal. The seams of cannel extend over a very large district in Lancashire. Some cannels produce more gas than others, but it is best to take the number of candles as the standard. From the best picked Lancashire cannel I have seen 24-candle gas made in iron retorts. That was from the Hayes seam. I never knew 26-candle gas to be produced from it. I was formerly engineer to the Preston Gas Company. My information concerning the Western Company was obtained from the returns, and from an inspection of the works. I was at the works yesterday. It is three or four years since I was there before. I was a shareholder in the company, but am not now in any company. I sold out, because I did not like the agitations that were going on. There have not been any very considerable alterations in the works since I knew them. I know nothing of what was done in 1850, except by hearsay.

Mr. WEBSTER: Shareholders hear if money is very badly spent in reconstructing works, do they not?

Witness: I was not a shareholder then; I lived in Lancashire. There has not been more money spent on the works than is usual, for gas-works are bound to keep up with the improvements of the time. If the capital is over £9 per ton of coal carbonized, it might be rather extravagant, but there is a great deal of the work which has not come into operation yet. There is a good future for the company, I think.

Mr. WEBSTER: There is a good time coming, even if they take off one shilling in the price of gas.

Witness: I do not know. There is room for improvements; there are enlargements.

Mr. WEBSTER: I understand you to say, that if there should have been as much as £9 or £10 of capital per ton carbonized, you think there has been so much work done that it is not excessive?

Witness: I think not.

Mr. WEBSTER: You think it will pay a very good dividend, I suppose?

Witness: I will not say anything about that.

Cross-examination continued: The variation in the quality of cannel coal for the illuminating power could not be represented by the variation of the prices in the market. We used to have tenders for the various qualities, and they were pretty much the same price.

Mr. WEBSTER: With reference to the falling off in the illuminating power, do I rightly understand you to say that the hydrocarbons will continue to be deposited through any length of main? that though at 1000 feet the principal part may be deposited, and therefore that may be a good point of distance at which to measure the illuminating power, you say that at 2000, and 3000, and 4000 feet there would still be a loss in illuminating power?

Witness: I can speak to 4 miles, though I never tested that loss by the photometer, but I know it must be so, because we find hydrocarbons in the meters. I do not think the cannel coal distils at a less temperature than the common coal. We could work it the same, but at most places they work it at a higher temperature. I cannot tell you what would be the loss in candles at 5000 or 6000 feet from the works of cannel gas which had an illuminating power of 20 candles at 1000 feet. I know there is a loss, because I find the hydrocarbons deposited in the meters.

Mr. *Hugh Bartholomew*, examined by Mr. MICHAEL.

I am a gas engineer, and have been for many years manager of the Glasgow City and Suburban Gas Company. That is entirely a cannel gas company. I have also been with the Liverpool Gas Company. We profess to give 28-candle gas at the works. I am not aware that our gas suffers deterioration by traversing the pipes. Hydrocarbons are deposited in the whole length of our works. For the year 1866 our cannel coal cost us 14s. a ton. We get about 20 different kinds, and that price is the average of the whole. The price is rising very much just now. The agitation in London is the cause of it. The effect it has had upon our company has been an increase in price, varying from 4s. 8d. to 6s. 6d. per ton. Our price is 4s. 2d. per 1000, with 15 per cent. discount to large consumers, the average being about 3s. 10d. With the rising price of coal, we shall require an additional 10d. per 1000. It has not come before our board yet, but we will have to do it. The same coals differ very much in quality in different parcels. Some coals are a great deal better than others from the same seams. We make 9000 feet per ton on the average. We do not use any common coal. Our parliamentary standard is 10 candles. The cost of our coal works out to 19·36d. per 1000 ft. We get for our products 5·757d., and that leaves 13·603d. per 1000. For the coke that is fit to be sold we get 5s. a ton, but about half the residuum of the coal we use we have to send out as rubbish, it being of no value. Supposing we were using all the best quality of cannel, such as Lesmahago, we should get 12 cwt. out of the ton. We have two furnaces for five retorts; we find that the most economical mode of working.

Mr. MICHAEL: Your works require to be larger than ordinary gas-works, because two furnaces are necessary instead of one?

Witness: It is not much extra expense; it is only the fuel. No more pace is occupied, as the furnaces are underneath the retorts.

Examination resumed: The total cost of our gas comes to 26·753, manufacture and coal included. Management is 1·972d. Our receipts are 46·39d.; distribution, 1·939d.; law and parliamentary charges, 0·261d.; leasehold redemption, 1·295d.; total expenditure, 32·221d. That leaves a profit of 14·169d. Our dividend is 10 per cent. on £150 000, and 7½ per cent. upon £50 000. Interest upon borrowed capital is 1·050d.; dividend at 10 per cent., 11·951d.; balance for reserve-fund, 1·162d.; total, 14·163d. The cost of coal is 1s. 3d. extra in London beyond what we pay. I have gone over the working expenses of the Western Company; they come as nearly as possible to our own. All the difference is in the cost of the coal. Supposing the coal were the same price in London as at Glasgow, they could do almost precisely the same as we do.

Cross-examined by Mr. WEBSTER: I go upon the statement handed to me by the Western Company. Supervision and labour is the most important item in the working expenses, amounting to 7·18d. per 1000 in the case of our company, and 7·10d. in the case of the Western Gas Company. That includes salaries of the engineer, clerks of the works, and stokers and labourers wages. It does not include the secretary's salary. The cost of distribution is 1·939d. per 1000 in Glasgow, while the Western is 1·63d.; we are more than

the Western. The reason is that we have a considerable extent of ground to go over. We have another company in our district Each company has pipes in each street. There is not a ruinous competition; we do not quarrel about price. We both supply gas of about the same quality and at the same price. Beside our capital of £200,000 we have £37,000 borrowed money, which we pay 4½ per cent. interest upon. Our sale of gas is 370 millions, and unaccounted for about 14 per cent. We were last in Parliament in 1865, I think. There is a great difference in illuminating power from the cannel; you can go from 20 to 45 candles. The Boghead gives the latter, but it is all made into oil now. It is nearly all used. There is a large quantity of cannel in Scotland. There is a great difference in price as well as in quality. One kind we pay 12s. for, and another 26s. 6d. One sort we can get for 8s. 6d. The price went up in consequence of this competition in London. The coal that we are paying 12s. for we used to get for 7s.

Mr. WEBSTER: I suppose there are plenty more pits to be opened?

The CHAIRMAN: That we do not go into.

Cross-examination resumed: I cannot give you the number of miles of mains we have. I have never had any experience in works using common coal.

Mr. WEBSTER: I suppose you agree with the last witness that the capital necessary to start cannel works is considerably less than that which is required to start ordinary coal works?

Witness: There cannot be much difference.

Mr. WEBSTER: Not if one is to make 24-candle gas and the other 12?

Witness: If you make nearly the same quantity out of the coals there cannot be any difference, except that the purifying of the cannel is more expensive than the common coal. Volume for volume, it would be about the same.

By the CHAIRMAN: The quantity of coal carbonized by our company is about 45,000 tons. Our cost would be much reduced if there was a districting system as there is in London. It would save expense in pipes, and also in collecting.

Mr. WEBSTER: As regards coal and capital, the figure is just £5 10s. per ton of coal carbonized.

Mr. MICHAEL: We have a good many witnesses who would give evidence as to the increase in the price of cannel coal throughout the country. I do not know to what extent the committee would like us to go in tendering that evidence.

The CHAIRMAN: I put the question to Mr. Webster whether he disputed the fact that the rise has been what you state it to have been, and I understood him to state that it had been. If it is not disputed, we may take it as a matter of fact.

Mr. WEBSTER: I understood you to ask whether I disputed the fact of that particular price having been paid; but I should not be prepared to assent to any particular scale of rise of price.

The CHAIRMAN: I presume the only object of proving a rise in price is to lead us to an inference with regard to the probable future cost of making either common coal or cannel coal gas; and it seems to me, as the prices at which cannel coal and common coal have been sold from time to time in London are matters of public notoriety, it might easily be agreed in five minutes between the counsel what might be taken to be the facts with regard to the quoted prices of cannel and cannel coal, and it cannot be necessary to produce a series of witnesses before us in slow detail to prove that.

Mr. HOPE SCOTT: We will endeavour to get some accord upon that subject; but I do not know how far my learned friend may be disposed to help us. There is one thing to be borne in mind, which has been stated by the last witness and the witness preceding him—viz., that what is quoted as cannel coal varies in illuminating power enormously, and that if it were sold for another purpose than gas-making it is evident that the quotation would not be one upon which you could rely.

The CHAIRMAN: We shall be ready to receive evidence upon any point which is of so much importance to your argument that it is really controvertial between you.

Mr. HOPE SCOTT: We will endeavour to come to an agreement; if we cannot, we shall then give evidence supporting our view.

Dugald Campbell, Esq., examined by Mr. MICHAEL.

I am an analytical chemist, and was formerly lecturer upon and demonstrator of chemistry at University College, London. For twenty years I have given attention to the manufacture and purification of gas.

Mr. MICHAEL: Do you agree with Dr. Frankland that you can get 10,000 cubic feet of 15-candle gas from Newcastle coal?

Witness: I have made experiments upon the point, and have never been able to get more than 9000 cubic feet of about 12-candle gas. I have seen the evidence given by Dr. Frankland as to the diminution of illuminating power by the admission of atmospheric air into the pipes, but I do not agree with him at all, for the reason that the gas in the pipes, when being supplied, is always under pressure; and if there is a fissure in the pipes and the gas is escaping out of them, I do not see how any air can gain admission into the pipes. Assuming that there is no pressure in the pipes, and that the pipes are at the same pressure inside as outside, I can understand that the law of diffusion would operate as stated by Dr. Frankland. Those laws would not come into operation unless there were equal pressures. The pressure being diverse, there would be an escape of gas, but not an admission of atmospheric air. I have turned my attention to the distance at which hydrocarbons are deposited in the pipes, and the result of my experience is that, as far as the gas is carried, the hydrocarbons are deposited; I have found them at a distance of six miles from the works. The higher the illuminating power, the greater the tendency to the deposit of hydrocarbons; therefore in cannel gas there would be a greater deposit than in common gas, and at a much larger distance; 1000 yards would not be any test as to illuminating power. If it was required to supply 20-candle gas at six miles distance, it would have to be sent out at a much higher illuminating power. I know of no process whatever, in the present state of science, that would prevent that deposition. The deposit is not attributable to defective working.

Cross-examined by Mr. WEBSTER: In my opinion there is a deposit of hydrocarbons continuously bearing some relation to the distance. I could show you, for instance, samples of water that have been taken from meters six miles from the works, with a deposit of hydrocarbon in them. The deposit of these hydrocarbons is, *pro tanto*, a diminution of illuminating power.

Mr. WEBSTER: Take, for instance, 1000 yards from the works; the principal amount of deposit would have taken place before you arrived at that distance?

Witness: A large amount of the deposit, but I would not say the principal amount.

Mr. WEBSTER: Assuming the gas made is 20 candles at the works, what would be the illuminating power at 100,000 yards?

Witness: It would be only guess work if I were to give it; I should be inclined to think there would be a diminution of 1½ or 2 candles. At five or six miles I should think it would be 4 or 5 candles, but it all depends upon the temperature.

Mr. WEBSTER: Let us go by degrees. May we take it at a candle per mile?

Witness: No; I think, for instance, for the first mile it would be more than a candle. For two miles it would perhaps be 2 or 3 candles. I have never made these experiments, but I have got samples of oils at various times in large quantities from the mains at different parts.

Mr. WEBSTER: My learned friend rebuked me for not allowing you to produce the samples of water which you said had been taken from a long distance from the works; will you produce them?

Witness: You were asking me for an illustration of the deposit that takes place at certain distances, and I thought there was nothing so good as showing the thing. This [producing it] is a sample of water taken from a meter six miles away from the works, and if it is allowed to rest you will see the oil collect on the top; there is also some in solution. I have no other samples of water, but I have 22 samples of oil deposited at various parts. This [producing it] is a part of a sample I had from Edinburgh a considerable time ago. This [produced] is another; it has the same smell as gas. The latter was sent to me from the Western Company, in London, for the purpose of analysis, not for this inquiry at all. The precise purpose it was sent to me for was to ascertain the amount of benzole in it. Benzole is rather a light oil, and a valuable one, and it was supposed that these were light oils deposited in the pipes; but it turned out that the reverse was the case, and that they were heavy oils, boiling at rather high temperature. I was to report as a chemist upon the residual value of the product. Residual products at the present time are worth very little; this product was almost worthless, and my advice to the company was to get rid of it for anything they could get for it. Residual products have been very valuable. I do not know how it is they are down now; I think the Continent sends a large quantity of those products. Benzole and aniline come in large quantities from the Continent.

Mr. WEBSTER: Has the agitation sent down the value of gas products as well as gas shares?

Witness: I do not know anything about the value of gas shares.

Cross-examination continued: The quantity of residual products that was worth 3s. some time ago is now not worth 10d. The Western Company have introduced all the modern appliances; in fact, more than most works, because, besides purifying with oxide of iron, they use lime purification. My observation as to the small value of residuals does not apply to coke, but to the liquid products. The water which I used from the Western Company came from the meter in the Egyptian Hall. The character of the water would depend a good deal upon how long the meter had been in use. If I had been going to draw it off I should have been able to get more oil from it, because on inquiry from the workman I found he did not take it at the top of the water, as I should have done, but from the overflow-pipe.

Mr. WEBSTER: As a matter of fact, if you are to have water produced from a meter all the circumstances under which it was taken ought to be known to you?

Witness: Yes. I made inquiries as far as I could from the man, who is a very intelligent workman. That water confirms the opinion I have given as to a deposit of hydrocarbons to a great extent. It proves nothing more than that. I have here a deposit of oil from a dry meter that has been sent me. [Producing it.] This is a portion of a large quantity. My object in producing these samples is to confirm the opinion I have already given as to the deposit of hydrocarbons being continuous, and to show also that they are of no value, comparatively speaking. I have tried to make gas out of them myself, by placing the liquid over pumice-stone heated to white heat; the quantity of gas was remarkably small, and the liquid distilled over unchanged. For the manufacture of gas I should prefer Boghead, if I did not want to get any coke; but to produce a good coke in London is of importance, because you get a good price for it. If you use Boghead you do not get coke. It is all illumination. The illuminating power of Boghead is upwards of 40 candles. Between 13,000 and 14,000 cubic feet of 40 to 45 candle gas could be obtained from a ton of some descriptions of Boghead; but one pit varies from another very much. If you did not obtain coke from Boghead you would get a lot of oils, including paraffin oil. Some of these oils are not now of much value. There is very little Boghead being distilled now, and I would not advise its being used. The next best is the Leeswood cannel. If it is picked over it would give about 13,000 cubic feet of gas of about 40 candles. Then I should go to Scotland—to Lesmahago, perhaps. I have experimented upon that very often in distilling it, but I have never taken the illuminating power. It is very fair, but it gives a bad coke. Wigan is a very good coal. The samples I have examined would give about 12,000 feet, but I have never taken the illuminating power. I should be inclined to think the temperature at which cannel coal distils would be higher than common coal, and the time required less, because you have a larger quantity of gas.

Mr. WEBSTER: Looking at the cost of manufacture, as regards the cost of retorts, and so forth, there would probably be no great difference.

Witness: That is an engineering question rather than a chemical one. I should have expected there would have been very little difference. I know nothing about engineering questions. Looking to the future of gas manufacture, I am favourable to the encouragement of cannel gas.

Re-examined by Mr. MICHAEL: The quantity of Leeswood cannel is very small. I do not know the price of Boghead coal at present. I have known it to be as high as 80s. a ton in London. What I have given as the product of Boghead would be from specimens picked by myself. I know the Boghead colliery very well; in fact, it is my brother-in-law's property, and I have been in the habit of picking pieces out of the pits. I do not mean to say that everybody would use the same samples as I should pick out. If the average is taken the illuminating power would be much diminished. Some of the true Boghead does not give a gas of a higher illuminating power than that produced from Wigan. The Boghead varies in colour from black to light brown, and it is the dark colour that gives gas of the least illuminating power.

By the CHAIRMAN: The light coal is the dearest, it being richer than the dark. It is a sort of clay impregnated with bituminous matter, and the more clayey its appearance the richer it is; and *vice versâ*, as it approaches the colour of common coal it gets less bituminous. Although I have said that the loss of illuminating power is greatest in the first 1000 yards, still in every subsequent 1000 yards there would be considerable loss.

The CHAIRMAN: Would it be a fair inference to draw from that, that, taking on the one hand the case of a country district, with extensive mains, say, extending for a distance of six miles; and, on the other hand, the case of a metropolitan district very closely inhabited, there would be a much greater loss of illuminating power in the former case than in the latter?

Witness: That is my opinion. There would be greater economy in supplying the gas in the latter case than in the former.

By Mr. MICHAEL: The oils I have spoken about are not impurities in the

gas, but the illuminating power made solid, instead of being in the gaseous condition.

Mr. MICHAEL: Having struck off the other witnesses whom we intended to call, that finishes our case.

Mr. HOPE SCOTT: I wish to bring under the notice of the committee a circumstance which I was not acquainted with till this forenoon. You have the bills of two companies before you—one the Imperial, and the other the Chartered; it seems that Lord Redesdale's rule requires that those bills should reach the Upper House upon the 18th of this month at the latest, therefore the bills will be imperiled unless they are taken at the earliest possible opportunity by the committee. As regards the Chartered Company's bill, I am desired to strike out everything that could have any bearing upon the general inquiry; as, for instance, some questions about burners, some questions about illuminating powers, and so on; so that now it stands as a bill simply to authorize the construction of new works, for the raising of capital, and for the capitalization of certain moneys.

The CHAIRMAN: I presume there would be some question as to the amount of capital to be raised, and the rate of interest at which the new capital should stand?

Mr. HOPE SCOTT: Yes; those we propose to deal with upon the ordinary footing, there is nothing in the bill on the subject, and we must have applied to us the general rules applicable to existing companies, with the further proviso that we should be bound by any legislation of a general kind affecting the other companies. The Imperial Bill is practically to the same effect. Under those circumstances, if the committee took those bills immediately after the holidays, they would see if they were bills which they thought could be proceeded with before the general inquiry is concluded. I am told that the bulk of the opposition is not of a kind to occupy any length of time.

The CITY REMEMBRANCER and Mr. RODWELL (representing petitions against the bills) stated that they had no objection to the course proposed.

The CHAIRMAN: Then we will take the Chartered Company's bill on Monday week. (To Mr. Michael:) Do we understand you to say that you have produced all your evidence?

Mr. MICHAEL: Yes.

Mr. HOPE SCOTT: After those bills are disposed of, you will, I presume, proceed with the general inquiry?

Mr. MICHAEL: I shall ask the committee to let me put in a table of the dividends of all the companies throughout the country, or as many as we could get.

Mr. HOPE SCOTT: I should like to have some indication of the opinion of the committee upon a point which has occurred several times in the inquiry. A quantity of tables have been published either last year or this; from time to time we have sought to give you abstracts of them. It would be a great convenience to everybody if we were to have those tables prepared, and hand them in, subject to their being contested, and to our calling witnesses if contested.

Mr. MICHAEL: That is what I propose to do.

Mr. RODWELL: Will you give us copies before they are laid before the committee?

Mr. HOPE SCOTT: Yes.

The CHAIRMAN: It is not our object, in the smallest degree, to exclude any evidence, but it seems to be a waste of time to take things in detail which might be put before us in a minute in an undisputed form.

Mr. HOPE SCOTT: What we will endeavour to do is this: we will get everything we think material tabulated, and communicate our table to the other side, then we will put in a witness just to prove the tables.

HOUSE OF COMMONS.

METROPOLIS WATER SUPPLY.

FIFTH DAY — TUESDAY, MAY 21.

EAST LONDON WATER-WORKS (VARIOUS POWERS) BILL.

(*Continued from page 502.*)

Mr. HOPE SCOTT said this bill, by permission of the committee, was interposed in the midst of the general inquiry, on account, he presumed, of the separate character which it had, both as bearing on the general inquiry, and as distinct from the other bill of the same company for a supply from the Thames, and he was happy to inform them that the consideration of it in his opinion ought not to be, though it depended very much with the opponents to say that it would not be, of any protracted duration. It was a very simple matter, and as such he would open it to them in a very few words. They should have before them (he did not know whether they had it) a plan of the East London Water-Works and of the River Lea Works. The object of those for whom he appeared, as he had already stated to the committee, and as they knew partly from the evidence given by the East London engineer in the general inquiry, was not to secure a new source of supply, but to improve that which they had, with a very moderate addition indeed of fresh water, but with a very considerable addition to their storeage power. Now the East London Company was incorporated in the year 1807, for taking a supply of water from the River Lea, and in 1852, as they was aware, it was not required to change its source of supply, as the Thames companies were in point of locality upon the Thames (though of course it was still the Thames) Sir James Graham's committee in 1851 resolved that the Lea water was sufficient for the purposes of a London supply. Nevertheless in 1852 the East London Company spontaneously went higher up than they were in 1807, and in 1853 they made a further attempt to go higher up the stream, in order to avoid, of course, the accumulation of pollutions which the closer neighbourhood to London must inevitably bring with it. They wished on that occasion to go up to the junction of the Lea and of the Stort, which the committee would observe was considerably higher up. They were, however, stopped on that occasion by the Government, who were the owners of the Small Arms and Powder-Works, which were marked upon the map "Royal Ordnance Works," just about Waltham Abbey, who objected to any diversion of the water at a point higher than their works, and that objection, he would add, continued to this day. He believed that that point had already been proved. Therefore now, in the year 1867, they were in the same position as that which they obtained in 1852, and which was slightly but not materially varied in 1853. Nor did they now propose substantially to change the site from which they took their water, the only addition to their means of supply being indicated by the dotted red line which would be found above the East London Water-Works reservoir, and which would take them up for flood water, but for no other purpose, as high as Chingford Mill. That was the only change in their position for the purpose of obtaining water, and that, as he would have to explain to them in detail, related to a supply of flood water to be impounded in some new reservoirs which he would mention presently. By the Act of 1852, although they were not required to change their source of supply, they were, like the Thames companies and other companies, put under the obligations of the Act with regard to the protection of their water and its proper preparation for use. They were called upon to filter, and that they did at Lea Bridge. They were called upon to cover up the conduit from the filter-bed to the pump, and they made a new conduit from that filter-bed at Lea Bridge down to their pumping-station, and a third obligation surposed upon them was to cover their reservoir near the pumping-stations. All these things they had done, and their position was now this: they derived their water from the mill-tails of the Tottenham and the Copper Mill as it was called (Tottenham Mill and Copper Mill would be found both marked immediately over the words "East London Water-Works reservoir"). In the neighbourhood of those mills they had storeage reservoirs, which were coloured blue upon the plan, the new works being coloured red.

Mr. HENRY BAILLIE: By the new works you mean the intended works.

Mr. HOPE SCOTT: The intended works. Then at Lea Bridge they had their filter-beds, as he had stated, and they had also at Lea Bridge a pumping-station. Then at Old Ford, to which the water was conveyed from the filter-bed in a new-covered conduit, they had another pumping-station, and by those means they carried on the supply at present to London, or at least to their district of London; and he was happy to be able to inform the committee, if they had not noticed in their returns, that they had been, on the whole, able to keep up with the population in the supply which they had given. It may not be considered an excessive supply; but except in unusually dry seasons, such as that of 1864, which was spoken of in the general evidence by Mr. Greaves, they had managed, he thought, to go on steadily with about 200 gallons per house, whatever the increase of the population had been. The year 1864 was an exceptional period, but by 1865 the reservoirs which they had constructed in the neighbourhood of Tottenham Mill, and which were voluntary works upon their part, and not imposed by any parliamentary obligations, became gradually more available, and they had at present 110 acres of reservoir, equal to 220 million gallons of storeage available in those blue sites to which he had already called the attention of the committee. The warning, however, which they had received in 1864, and some additional warning which they had received in 1866, had induced them to come to Parliament for power to increase their storeage reservoir, and to feed those reservoirs more effectually by carrying the conduits, which now did not proceed further than the tail of the Tottenham and Copper Mills up to Chingford Mill, or rather up to the Lea above Chingford Mill, from which in time of floods they hoped to derive a very considerable accession to their storeage power. At present they had, as he said, 110 acres of reservoir. What they proposed to do was to add 100 acres of storeage reservoir, but of a larger capacity than the reservoir which they now had—that was to say, deeper, and therefore capable of containing a quantity which would make their present 220 million gallons of storeage up to 500 million gallons; and they proposed also to construct new filter-beds in the neighbourhood of Lea Bridge, which they would find coloured red—the existing works being coloured blue at that spot. That was one portion of their scheme. Except from some private individuals, who were interested in the water, and to whose petition he would call attention presently, there was no opposition to that part of the scheme. That portion of the scheme related to discoveries which were made in consequence of the outbreak of cholera in the east of London last year. The committee knew well that under the general Metropolitan Water-Works Act of 1852 the Board of Trade had power, especially under section 9 and the following sections, to cause an inquiry to be made in the event of a memorial of complaint being presented on behalf of the consumers. Such a memorial was presented, and such an inquiry was directed. Captain Tyler was the officer who conducted that inquiry, and as yet they had no report from him. He believed that Captain Tyler was in the room, and he was told that he had come at the instance of the committee. Of course, therefore, what he was about to say must be taken subject to any qualifying remarks which Captain Tyler might have to offer. They had not yet the advantage of being guided by his report; and here he might be allowed to state that they made every effort in their power to facilitate the issue of that report, because there being some questions in dispute he believed between the different chemists as to particular modes of test, and it having been arranged that that matter should be further discussed before Captain Tyler, they had waived their wish, at least, to have that inquiry prosecuted for the present, believing it to be more important that they should have Captain Tyler's general view of the question for the purpose of guiding them in the conduct of their bill, than that they should have what he understood to be a somewhat abstruse point decided between two scientific men. Subject, then, to what Captain Tyler might tell the committee, they came to the conclusion that there was at Old Ford, or in the neighbourhood of Old Ford, something to be remedied, and that remedy they sought to give by the bill. He would not go into the questions, which were also discussed between scientific and practical men, as to whether the use of water of an impure character was the immediate generant of cholera, or whether circumstances of bad drainage and filthy habits might not have a very large part, if not the chief part, to do in such a matter; but it seemed that in this inquiry it was assumed (or was proved) to the satisfaction of those concerned in it, that it was impure water which generated the cholera in the East London district. It was attributed immediately to the Old Ford supply, and not to the Lea Bridge supply—both having their water from the same source, both filtered in the same manner—and naturally after those points had been so far ascertained, it was a matter of interest to inquire whether there were any speciality connected with the Old Ford supply which did not apply to the Lea Bridge supply; and it appeared upon inquiry that at the Old Ford supply reservoir, the covered reservoir when it was emptied—which was done at the instance of Captain Tyler—some percolation was observable, and that percolation appeared to come from the Lea itself in the immediate neighbourhood of the reservoir. Another ground was this: adjacent to the East London pumping-works at Old Ford and to their covered reservoir there were left some of their old uncovered reservoirs which it was not the intention of the company to have used for the purposes of the supply of that portion of the town, but which certainly, and under the pressure of a great want of water, had occasionally been so used. They had, therefore, those two points distinguishing the Old Ford supply from the Lea Bridge supply, which in their general characters must be the same—that there were at the Old Ford station special circumstances which might have caused a difference in the water as supplied out to the public. It was to remedy these evils that the other portion of their bill was proposed. The percolation into their covered reservoir was evidently connected with the levels and with the soil. The Lea was only 70 or 80 feet from that covered reservoir; that covered reservoir went down to the level of the bottom of the Lea, and, in fact, he believed a little lower, and a portion of it was constructed in porous soil. The other portion was constructed in stiff clay; and what they proposed to do in order to obviate the possibility of of percolation was this, to fill up as much of the old reservoir as was in the porous ground, and with regard to that which was in the clay to raise the bottom of that reservoir to such a height as to render any considerable per-

solation from the Lea, even if the construction were defective, impossible. Of course every effort would be made to make it water-tight; but they would have all the advantage in so doing of having less depth of reservoir to deal with, and being, therefore, by the mere circumstance of level, protected from the percolation from the Lea. The effect of doing this would be, practically speaking, to reduce the storeage reservoir there into a pumping reservoir. At Old Ford their pumps were very powerful, and, he might add, being very powerful were very costly; and in order to draw properly the water which had to be supplied by them, it was desirable, upon engineering grounds, that there should be a small deposit of water, so to speak, close to the pumps, and that they should not draw directly from the mains which came down from Lea Bridge; so that they would totally alter the character of that place, as he understood, which at present being a covered reservoir of some considerable extent for the purpose of storeage of water as well as for the purpose of facilitating the working pumps, would be hereafter really a supply of water, so to speak, in connexion with their own main from the filter-beds from the purpose of enabling the pumps to be properly and efficiently worked. Then, with regard to the other evil arising from the old, uncovered reservoirs, which, as he said, the company's servants had been tempted to resort to when they had no water coming properly under the terms of the Act, they proposed that these should be filled up, and that the use of them should be rendered impossible. By these two contrivances they would meet two recognized defects. Whether there were any others to which attention might be called by Captain Tyler he could not say. They had supposed those to be the two principal things, and to those they had addressed themselves, and for the purpose of remedying them they had added clauses to the bill. He should qualify what he had said about the uncovered reservoirs being filled up by this, which he found in the clause—that it would be necessary to keep a portion of one of them open in order to give an overflow from the covered reservoir, because the Lea varying in height with the action of the tide, they might not at all times be able to send their surplus water from the covered reservoir near the pumps into the Lea, and therefore a portion of the old uncovered reservoir must be reserved, it appeared, for the purpose of discharging the surplus, but for no other purpose whatever. Now the clauses were these:—

The company shall, to the satisfaction of an inspector to be appointed by the Board of Trade, and within the respective periods in this section mentioned, do and abstain from doing the acts and things which they are severally by this section bound to do and abstain from doing respectively; and shall, to the like satisfaction, execute the works in this section mentioned (that is to say)—

(1) They shall, within two years after the passing of this Act, fill up with fit and sufficient earth and materials to the level of the adjoining land there the southernmost of the company's open reservoirs, situate on the eastern side of the river Lea, at Old Ford, and shall abstain from using at any time the same reservoirs, or either of them, otherwise than for receiving into the northernmost of those reservoirs filtered water overflowing from the company's covered reservoirs situate on the western side of the river Lea, at Old Ford.

(2) They shall, within two years after the passing of this Act, fill up with fit and sufficient earth and materials to the level of the adjoining land there the northernmost of their open reservoirs at Old Ford, except a part thereof not exceeding in area one acre, which they may retain as an open reservoir for receiving filtered water so overflowing, and that water shall not be in any manner used for the purpose of supply, but shall be from time to time discharged into the river Lea. [That is, of course, when the tide was down and they could do it effectually.]

(3) Those open reservoirs respectively shall at all times remain and be wholly and efficiently cut off from communication with the company's covered reservoir and other works, except by any channel which shall be so contrived with respect to direction and level as to allow of the passage of water overflowing from the covered reservoir into the northermost open reservoir, and as not to allow of water passing from the open reservoirs, or either of them, to the covered reservoirs; and any such excepted channel shall not be used until the same has been approved by an inspector appointed by the Board of Trade.

(4) So soon as the company shall have completed for use, to the extent of an area of six acres, the additional filter-beds by this Act authorized, and not later than three years from the passing of this Act, the company shall wholly abandon the use of, and fill and stop up with fit and sufficient earth and material, the easternmost portion of the company's covered reservoir at Old Ford (which portion of reservoir was heretofore a separate reservoir); and shall also fill up with fit and sufficient earth and materials to the level of a line 4 feet above the level of the now existing bottom of the next mentioned portion of reservoir, the westernmost portion of the company's covered reservoir at Old Ford (which portion of reservoir was heretofore a separate reservoir); and they shall within the same period execute all necessary and proper works for rendering the westernmost portion of reservoir wholly water-tight and free from soakage or leakage as a complete and independent reservoir, for the reception of filtered water and for use, in connexion with the company's pumps for distribution at Old Ford.

(5) The company's canal, which before the completion of the works authorized by their Act of 1853, was used for the passage of water from the river Lea, at or near Lea Bridge, to their reservoirs at Old Ford, shall for ever remain and be wholly and efficiently cut off from communication with the company's works of supply and every or any of them. [That was to say that the old aqueduct now did so, which was coloured blue upon the map.]

(6) And if the company violate, refuse, or neglect to comply with the several duties and obligations imposed on the company by this section or any of them, the company shall become liable to the penalties mentioned in the 16th section of the Metropolis Water Supply Act, 1852, in the same manner and to the same extent as if the same duties and obligations had been imposed on the company by that Act.

That exhausted everything in the way of the works which we proposed. Those works, he should mention, are estimated to cost in the whole £160,000. He had said that those were all the works which they proposed, because there were works in the bill which they did not propose.

The CHAIRMAN: That is for those works which you describe.

Mr. HOPE SCOTT: For those works; and those were the only works which they proposed.

The CHAIRMAN; I thought you proposed the dotted line of the canal.

Mr. HOPE SCOTT: These were the whole of the works. He would enumerate them:—For going up to Chingford Mill and bringing water at flood-time down to the old reservoir and to the new reservoir which they proposed for filling up the old aqueduct; altering the present covered reservoirs at the pumping-station at Old Ford, and filling up so much as was to be filled up of the other reservoirs at Old Ford, and forming the necessary communication and the filter-beds, and the capital for that was £160,000.

The CHAIRMAN: That is the whole of the works which you now propose to have sanctioned.

Mr. HOPE SCOTT: The whole of the works which they now proposed; but besides those works there were others which were proposed in the printed bill, and which they had now struck out. He would explain briefly what the objects of those works were, and, he hoped equally briefly, why they had struck them out. They would see marked on the map coloured yellow, and under the word "Edmonton," an intercepting drain, which in 1852-3 they obtained power to construct, their object being to clear their supply from the river as far as possible from the introduction of sewage. After that they sought to go to a higher source, and failed. This year they proposed originally further works of interception, and these they would find coloured red; but they were now struck out of their bill, and under these circumstances: in the first place they were met with a very considerable local opposition (he did not know how many petitions turned upon that point, but there were five or six at the least, he thought); in the next place, the matter of intercepting drains—in short, the preservation of the river Lea from impurities—was brought before the notice of the Metropolitan Board of Works by their own engineer, Mr. Bazalgette, no doubt upon their direction; and the same gentleman, who had large experience of this matter, being the engineer of the great intercepting drain of the Metropolitan Board of Works, was also consulted by the Tottenham Local Board of Health; and to each of these authorities he gave a report upon this subject. To the Metropolitan Board he reported that the sewers or drains to be built under this bill at the nearest point would be about five miles beyond the jurisdiction of the board. That the power sought to enable the board to contribute to the funds of the company should be struck out; that the works did not appear to be such as would purify the water of the Lea within the metropolis, and that to be effective they should be of a more comprehensive character; and that the proposed reference of the board's power to arbitration should be opposed. Then to the Tottenham Local Board of Health he reported that the river Lea formed the natural outfall for the drainage of some ten or a dozen places, and that nothing short of an entire removal of their sewage by a combined and comprehensive system of sewers would purify the water and render the district a well-drained suburb of London; that ineffectual efforts had been made to dispose of the sewage by deodorization and so forth; that Stratford formed a striking illustration of the bad policy of one separate town attempting to carry out its own independent system of sewerage; and then, further on, he said: "I recommend, therefore, that the above places be combined by an Act of Parliament and formed into one sewage area, the boundaries of which are intimated generally by the coloured portion of the map;" and then dwelling upon this, he said: "If this more comprehensive system be carried out it would be unnecessary for the East London Water Company to execute the sewerage works contemplated by them for the partial purification of the upper portion of the river Lea." But besides the authority of Mr. Bazalgette, they had since then had a report upon the river Lea from the Rivers Commissioners, of which he thought they were in possession. Those commissioners were of opinion that powers similar to those which had been applied by the Act of 1865 to the Thames, within certain limits, and were sought to be applied by the Act of 1866 to other portions of the Thames, should be applied also to the river Lea. Under those circumstances, they had felt that the question had become much too large for them, and that they could not possibly deal with it in a general manner, and they were told that unless it was so dealt with no effectual remedy could be had. Under those circumstances he thought they would consider that the company had behaved reasonably and rightly in striking out from their bill everything that related to the further intercepting of sewage, which they were inadequate fully to carry out. Having given this account of what was in the bill and what was not to be in the bill, he would now proceed to the oppositions. He was sorry to find that the Metropolitan Board of Works were still their opponents. They had some general allegations with regard to the water supply, but he would call attention particularly to that with regard to the sewerage works, in which they seemed to have adopted the very language of their own engineer's report to them: "That the works contemplated by the said bill are not, your petitioners submit, sufficient to purify the water of the river Lea within the metropolis, and that to be effective they should be of a more comprehensive character." Now they thought, upon the withdrawal of their intercepting works, that this portion, at any rate, of the Metropolitan Board's objection would have fallen. Its other objections were of such a general kind that they could hardly make out to what they wished to direct their opposition, but, to their surprise, they found it was the omission from the bill of the sewerage works which was now their principal ground for complaint. The moment the intercepting works were struck out of the bill they gave notice to all the opponents, and for a very good reason, that they would have rendered themselves liable for costs if they had kept them before the committee without reminding them of that fact, and amongst others they gave notice to the Metropolitan Board of Works. He believed the whole of those who were petitioners against them upon the ground of the sewerage works, on receiving their notice withdrew their opposition, and there were no opponents now before them except the Metropolitan Board of Works.

Mr. PEMBER: The River Lea Trustees are here.

Mr. HOPE SCOTT: But that was not upon the question of intercepting, was it?

Mr. PEMBER: There are certain clauses still in the bill, as to the purification of the river, giving new jurisdiction, which we want to see struck out.

Mr HOPE SCOTT: Did not think the River Lea Commissioners were objectors to the principle of purifying the river. However that might be, they gave notice to all the different parties. They would assume for the present that the River Lea Trustees were here for the purpose of considering something connected with the sewage, but all those who had directed their opposition principally against them on the ground of their taking power for intercepting works had withdrawn except the Metropolitan Board of Works. To that board they gave notice as they did to the others on the 16th of this month, and they asked them then to tell them what they would do. They repeated that question by letter on the 8th, and followed that up by application on the 13th of this month, and it was not until the 20th day of May that their body (whose hands he presumed were already too full of what they had to do, but who, nevertheless, never seemed unwilling to take further powers if they could obtain them) favoured them with an answer written by Mr. Wyke Smith, the solicitor to the Metropolitan Board of Works, dated May 20, and addressed to the solicitor of the East London Company. "My dear sir,—The committee of the board has to day again considered this bill with the various amendments and alterations which you propose to make. The feeling is very strong that the advantages which were held out for Parliament giving the powers ought not to be withdrawn, and that as the neighbourhood would benefit by the works now to be withdrawn, the board decline to withdraw that petition, as they must submit that the works ought to be carried out if the other powers are to be given, but that if the old clauses are not restored the bill ought not to pass." Now some moderate degree of consistency was required of individuals certainly—whether it was to be required of a public body he really could not venture to say—but those were the gentlemen who petitioned against these very words in the language of their own engineer, who had reported against them, saying: "That the works contemplated by the bill are not, your petitioners submit, sufficient to purify the water of the river Lea within the metropolis, and to be effective they should be of a more comprehensive character." What that character was they knew from the report of Mr. Bazalgette partly to them, and partly to the Tottenham Local Board of Health. And having complained of the clauses when they were in the bill as being inefficient, they complained of them now for having struck out those clauses, delaying their answer to the notice which they gave them on the 6th, until the 20th of May. What their objects might be he did not know, but their information as to their grounds of opposition was now contained principally in the letter to which he had called the attention of the

committee. Under ordinary circumstances he believed that they might well object to their *locus standi*, because though they constantly told them that they were empowered by Act of Parliament to oppose, yet he thought that the rules of *locus standi* would hardly apply to a case which was beyond their jurisdiction; however, it was hardly worth discussing that point, since they complained of absence, and since they had their own report, the report of their own engineer, and the River Commissioners and common sense upon the side of those clauses being omitted which they themselves in the first instance seemed to desire when they petitioned against the bill. Now with regard to the other opponents, there were three, he thought, in all —Mr. Bosanquet and the two Messrs. Hunt. The way in which those petitioners alleged that they would be affected by the withdrawal of water which now passed by some sluices into an old moat which surrounded the houses was this:—"That your petitioner Samuel Richard Bosanquet is the owner, and your petitioner Henry Boston, jun., is the lessee and occupier, of a farm called or named as Low Hall Farm, in the parish of Walthamstow and county of Essex. That the lands and properties belonging to and occupied by your petitioners have from time immemorial been supplied with water from the river Lea by means of a sluice under the control of your petitioners, situate on the Copper Mill stream, and called or known as Burup Stile Sluice. The waters so derived, besides being used for irrigation, and the usual farm and domestic purposes for which they form the only means of supply available to your petitioners, are also used for supplying with a current of fresh water a moat which surrounds an ancient farm-house belonging to your petitioner, the said Samuel Richard Bosanquet, and occupied by your petitioner, the said Henry Boston, jun., and which moat forms a feature of interest and picturesque beauty to which your said petitioners attach great value." He thought that if he had added that it was a source of frequent chills in the family, and probably miasmatic influences, he might have completed the picture. "That it appears, from the plans and sections deposited with reference to the said bill, that the construction of the said reservoir will have the effect of destroying the said sluice, and entirely cutting off the supply of water upon which your petitioners depend for the purposes for which it has been hitherto used; and not only is no provision made by the bill for remedying this evil, but on the contrary, by the 21st section of the said bill it is expressly provided that when the company acquire under the Act to follow on the said bill any land or stream, all rights of way and of water, and other rights affecting the same, are by such Act to be absolutely extinguished. That while the bill will have the effect of inflicting irreparable loss and injury to your petitioners, it proposes no means whatever of diminishing this injury, either by a supply of water in compensation for what is proposed to be withdrawn from them, or by any other equivalent. That the present supply of water is essential, and so forth." Now what they had to say on these petitions was, first, this: they entirely denied any right of the petitioners to the use of this sluice.

The Chairman: Is there any compensation clause in the bill?

Mr. Hope Scott: There was the general compensation; there was none in water, but there were the general clauses, of course, giving to everybody entitled to it compensation—money compensation—in the ordinary form. No special compensation could be put into this bill, because those gentlemen would have to prove their title with regard to the water before any compensation could be awarded them. That would be a sufficient reason in itself for not deviating from the ordinary rules in these matters; but there were, of course, for persons who had rights, the fullest possible provisions in the Water-Works Clauses Act and the Land Clauses Act for any case of this kind. Then the next case was that of the Messrs. Hunt, who were petitioners in respect of Chingford Mill. He had already named Chingford Mill more than once. The difference in their position with regard to Chingford Mill would arise by the construction of the new conduit, dotted red upon the plan, which took them so much higher up the river Lea. Well, the position of those petitioners, whose petition he did not think it necessary to read at length, was a somewhat peculiar one. The River Lea Trustees were originally the owners of the water of the river Lea, and were empowered by Act of Parliament to sell it. They were also the owners of Chingford Mill and the water right of Chingford Mill. In the year 1855 the River Lea Trustees were authorized to sell to the East London Company and the New River Company, and did eventually sell to those companies, all the water of the river Lea which was not needed for the purposes of navigation. They were therefore new annuitants, so to speak, for the purposes of navigation, and were no longer owners of the water; *inter alia* they sold them the water, of course, which supplied Chingford Mill, which was their own property. They could not sell them water in such a case so as to deprive the owners of the different mills of their right of supply, but in respect of their own property they could and did sell all the rights of water which they possessed, subject to the right of navigation. The same Act contained power to purchase Chingford Mill itself. They did not exercise those powers, and they have lapsed, and they now sought power to purchase the mill upon this occasion. It was their lessees who complained upon this occasion, and to their lessees they had said, "We reserve the power to part with the water which supplies this mill." They did part with that water, and a clause in their lease was, that if their tenants were damnified by any act of theirs with regard to the sale of the water, they, the lessees, might give up their lease, so that the lessees were in Chingford Mill with full notice of what the River Lea Trustees had power to do, and their remedy was simply to leave the mill, if they found inconvenience from the exercise of those powers. But their power of taking the water was by section 34 of the bill, at page 19, and it was a limited power. They were not to take it except while the river was in a state which was defined by the 29th section of the River Lea Water Act, 1855, as a state of flood, or except in such manner and to such extent as were consistent with the rights of the New River Company in that Act set forth, and under the agreements from time to time in force between the companies. That clause was inserted by agreement with the New River Company, who were themselves largely interested in the water below Chingford Mill as owners of Tottenham Mill, and who were entitled by arrangement with the River Lea Trustees to take a large quantity of water from that point. They were satisfied with the restriction in the clause, and it was evident that if this were a mill-owner who had an absolute right to the water, instead of such a qualified right as the lessees of the River Lea Trustees had, the restrictions of that clause, by preventing them from taking water except when the river was in flood, would prevent them from taking it when it was of any use whatever to the mill. So much for that case. With regard to the River Lea Trustees, he believed that the questions between them and the River Lea Trustees would turn into a pure question of clauses; but he was told that they resisted the purchase by them of Chingford Mill. It was not so material to them to purchase Chingford Mill, though the engineer might explain why he sought it. Since they had bought the water of the Chingford Mill from them they would not be able to claim any compensation whatever from them. There was a special clause in the Act of 1855, section 62, which said, "The trustees shall not be entitled to claim against the two companies, or either of them, with respect to any weirs, falls, mills, or fisheries, or any other rights or privileges now belonging to and enjoyed by the trustees, any compensation on account of any abstraction of the water, or any other incidental damage or injury from time to time occurring by the exercise of the two companies, or either of them, of the powers and authorities of this Act."

The Chairman: They say that you are to take it from the tail of the mill, and not the head of the mill.

Mr. Hope Scott: But they had bought the whole water, subject to their having a certain amount of water given for navigation purposes. It was under this Act that their title was, and they were entitled now, as regarded the River Lea Trustees, to take the whole of the water which was not necessary for the purposes of navigation, with a special proviso that they should claim nothing in respect of compensation for mills and weirs. "Subject to the provisions of this Act, all the water from time to time flowing into or down the river Lea and the navigation thereof, which the trustees had now power to sell under the Trustees Act of 1850, except such quantities thereof as are reserved by the trustees for the purposes of navigation, is by this Act transferred to, and shall be absolutely vested in, the two companies for ever." They, the River Lea Trustees, were merely, as he said, annuitants under another clause for the purpose of keeping up the navigation. It was under these circumstances that they conceived that the River Lea Trustees ought to offer no impediment whatever to their proceedings, which were founded upon a title derived from themselves. That, he believed, was all he need say in opening this case.

Charles Greaves, Esq., examined by Mr. Clerk.

I have been engineer of the East London Water-Works Company since 1851, and those works which were done subsequently to the year 1852 were entirely designed by me and carried out under my superintendence. The construction of the intercepting drain in the year 1853, and in the subsequent years, had the effect of elevating, so to speak, the purity of the lower portion of the river to the degree which the river had at Enfield Mill-tail. All the sewage which entered the river Lea between the Enfield Mill-tail and the place where we take our water, on the right bank of the river—the sewage of a very large population—was by that means entirely diverted, and carried to the lower reaches of the river below the point at which the company take out their supply below Tottenham Mill. Subsequently to the Act of 1853, the company purchased the Copper Mill. The property, as a copper mill, had become disused, and it was desirable to prevent any other owner acquiring it, and therefore the company purchased it to prevent any further mischief arising, and to acquire power over the stream and the use and advantage of the fall with reference to such reservoirs as they might afterwards be empowered to make. We took down all that was unnecessary of the mill; some of the buildings remain; there is a very good water-wheel. The filtering-beds at Lea Bridge were constructed 12 acres in extent, partly in the county of Essex and partly in the county of Middlesex. We had a covered conduit from those filter-beds down to our pumping establishment at Old Ford; an iron pipe was laid to convey the water. At the time the Act was passed, in 1853, there was no steam-power at Lea Bridge; there was nothing but water-power. The two small reservoirs in the neighbourhood of Old Ford were made into one and covered over. They lie on the western side of the right bank of the river Lea. The bottom of one of the reservoirs is entirely clay, and the other to a large extent is clay, but there is a certain softness in it, from which I conclude that the borders are of a similar material, but I never dug into them to see. I have never had any reason to doubt that the reservoirs were fairly well puddled when they were made. The full water surface of them is 2½ acres; the bottoms, of course, are much smaller. The partition between the two reservoirs still exists in the lower part. When the water is full it stands about 5 feet deep, or a little more, on the portion which is removed from between the two. On the eastern side of the river Lea there are two uncovered reservoirs which were left in 1853, and they have been somewhat diminished since, having been used as a deposit for the waste soil which the company had to dispose of. All the works which we had to do in 1853 were inspected by gentlemen (Mr. Ranger and Mr. Dickens) who were sent down at the time by the Government. They were under the Home Office in some way, I believe. Before the works were designed, in 1852, the company had been taking their water from below Lea Bridge Mills, and under the Act of 1850 they had acquired power to take their water immediately above the mills, but nothing further had been designed or proposed until the scheme for the Act of 1852. In the year 1853 the company introduced a bill in Parliament for the purpose of taking their water from Field's Weir, at the junction between the Stort and the Lea, but we were opposed by the Government on account of their factories at Waltham and Enfield, and prevented from taking our supply higher up than their works. We have never obtained any further parliamentary power since the Act of 1853, except for the raising of money, which, of course, goes to the general extension of the company's pipes and distribution. We have been constantly watching with a great deal of attention the quality of the water supplied, and there has been a continual chemical analysis of the water, for the purpose of keeping the company informed as to the condition and quality of the water which they were in the habit of delivering. A double analysis has been taken for a great part of the time, in order to check the water capable of being delivered from the two different departments of the concern, the water has been analyzed as it came from the main in a populous part of the town. We have done a good deal, and should have been glad to do more, but it never appeared that power sufficient existed within the compass of the company's Acts, or any other Acts. We have purchased several miles of the bed of the river, and lands bordering on the river which were capable of receiving buildings for factories. One estate in particular we feared was about to be built upon, and we purchased it at a very heavy expense, in order to prevent the establishment of a factory upon it. Until last autumn, when there was that great outbreak of cholera in the east of London, nothing had been said at all to impugn the quality of the water supplied by the East London Company. We have generally been held as delivering water quite on a par with the other companies, but in the autumn of last year public attention was a good deal directed to the quality of our water. Nothing further can be done in extending the intercepting drain without new parliamentary powers. The quantity of water in the river is the subject of continual gauging, and those gaugings are computed, and carried out, and kept for my information. The quantity of water delivered by us has been continually increasing in a very rapid ratio—from 14,500,000 gallons daily in 1856, to nearly 19,500,000 gallons in 1866. Our attention was called in the year 1864, during that very dry summer, to the capacity of the river for giving any further supply of water, and rather particularly to the magnitude of the river and the want of water. At an earlier period—as far back as 1859—I had to take it seriously into consideration, and, in consequence of views which I laid before the directors of the company at that time, the idea of making storage reservoirs was accepted as one of the duties which the company had to undertake; and, in consequence of that, we went on with those reservoirs, which were partially completed in 1864, and at that time became of immense service.

Between 1859 and 1864 we had constructed some additional storeage reservoirs at Walthamstow. We had at that time 45 acres; there is now an area of 110 acres, and there is in them about 220 million gallons, of which the lower 50 million gallons will not run off—they would require to be pumped; but the 170 million gallons is capable of being drawn off without any trouble. The depth of the reservoirs is from 10 to 11 feet. I have attentively and closely considered the necessity of further enlarging our storeage area in that neighbourhood, and I think the wisest thing that we can possibly do is to have as large a body of water in hand available close to us as we can acquire. The 110 acres were purchased, the estates being in the market; the adjoining estates, which are suitable, are in trust or under some disability as to sale, which we cannot get over without parliamentary power. I do not think there is any possible plan available for the improvement of water-works in any way but what I have considered or have had under my notice. I have carried out a large survey, to see whether it was possible to get water from the Ouse, or whether it was advisable water to bring. The quality is certainly not bad, but it is inferior to the Thames. The distance is very great; I could not get to the Ouse under 48 miles, and I could not get it over a lower summit than 350 feet, and only that by tunnelling a considerable distance. I have made a bore into the chalk in the neighbourhood of Walthamstow, to see if the chalk was prolific in water. I sunk a well, and carried a 12-inch bore down to a great depth within the area of the reservoir property, but I found the supply from the bore was but moderate, and not sufficient to give one any hopes of a larger supply; it was under half a million gallons a day. I believe the committee are aware that we have a scheme still before Parliament of obtaining an additional quantity from the Thames. There was no difficulty between the years 1859 and 1864 in filling those reservoirs which we constructed at Walthamstow. The wisest thing to do appears to me to be this: to construct, if possible, additional storeage reservoirs in that neighbourhood. It would be the work that would be the most rapidly carried out; we could conclude it in a very short time after obtaining parliamentary authority to get the land. By this bill we shall add 300 million gallons or more to the quantity we are at present able to hold; then, I think, we may safely say that we should have at Walthamstow more than 500 million gallons. The area of the additional storeage reservoirs is 100 acres of water. I propose to fill them to a greater depth than the existing reservoirs, and also to fill a portion of the existing reservoirs to a greater depth than they are now filled; so that, under the new section of the works, I credit myself with rather a larger quantity than I get from the old work. The works which we propose to construct in this bill are those contained in clause 6—A, B, C, D, E, and F, down to O. They are all marked on the plan which the committee have before them with the same letters. The works A and B are additional filtering-beds, adjoining the present establishment of filtering-beds, at Lea Bridge; those are entirely unopposed. D is a reservoir and filtering-beds on lands in the parish of Walthamstow, adjoining the southern side of Copper Mill Lane—they lie on the southern side of the already constructed reservoir; and C is a reservoir, pumping-station, conduits, and other works made, or partly made, by the company, in the parish of Walthamstow, at or near to buildings and property called the Copper Mill. It is to give parliamentary sanction to those works. C is already completed. Then D is "a reservoir or reservoirs and filtering-beds, wholly in the parish of Walthamstow, on lands adjoining or near to the northern side of Ferry Lane;" that is a work with regard to which there is some opposition on the part of a gentleman named Bosanquet. The stream to which that applies passes through that property. F is a conduit connecting one reservoir with the other. G, H, I, J, M, and N, are also all conduits for filling one reservoir from the other across existing roads. There is no objection whatever to any of those works. N is "a conduit or aqueduct, commencing in the parish of Walthamstow, to the eastward of France Weir, in or near to the northern extremity of the reservoir or reservoirs and filtering-beds, and terminating in the parish of Chingford, in the county of Essex." It is proposed to bring the water from Chingford Mill-head by that conduit, into one of the now intended reservoirs. That is a matter with regard to which there is some opposition before the committee, on the part of the River Lea Trustees as the owners of Chingford Mill, and on the part of Mr. Hunt, the lessee of the mill.

Mr. CLERK: Therefore I may take it that, as far as we know, of these works which you propose to construct, the only one which is opposed is reservoir E, which is opposed by Mr. Bosanquet, and this Chingford conduit is opposed by the River Lea Trustees as lessors, and by Mr. Hunt as the lessee of Chingford Mill.

Mr. PEMBER stated that the bill was also opposed by the River Lea Trustees as guardians of the navigation.

Witness: Clause O is "cleansing, scouring, deepening, widening, protecting, and preserving of the river Lea from a point northwards of Flanders Weir to the Ferry Boat Inn, in the parish of Walthamstow, and which portion of the River Lea is in the parishes of Chingford and Walthamstow, and Edmonton and Tottenham, in the county of Middlesex, or some of them." That is unopposed. The situation in which we propose to place these reservoirs is a very good one for storing water; it is unobjectionable on every ground that I know of. It is well on one side of the line of floods, and it is not liable to injury of that kind at all; and it is quite sufficiently removed from London atmospheric influences. We find very little deposit from the atmosphere of any kind as far away as that. The increase of population of Walthamstow is very slow; indeed, I am not sure that it increases at all. In the neighbourhood of the works the land is low; the land there is the flat of the valley. I do not think there is any fear of the water becoming stagnant in these reservoirs. On the principle on which I should work them, I should maintain the circulation as much as possible. We at present maintain complete circulation in what we have, and there would be no difficulty in extending that circulation to the whole. I do not contemplate at present the construction of filter-beds at Walthamstow; possibly it may be one of the works which may devolve upon us hereafter. We justify the construction of filter-beds by saying that we take the power to construct the filter-beds, but it is not exactly at present intended. Lord Maynard is the owner of all the land on the northern side of Ferry Boat Lane except one field; the trustees are not opposed to our scheme. Mr. Bosanquet is a considerable landowner of adjoining land.

Mr. CLERK: You have seen the petition and the allegations of Mr. Bosanquet, I believe. I see that Mr. Bosanquet alleges, "That the lands and properties belonging to and occupied by your petitioners have from time immemorial been supplied with water from the river Lea by means of a sluice under the control of your petitioners, situate on the Copper Mill stream, and called or known as Barup Stile Sluice. The waters so derived, besides being used for irrigation and the usual farm and domestic purposes, for which they form the only means of supply available to your petitioners, are also used for supplying with a current of fresh water a moat which surrounds an ancient farmhouse belonging to your petitioner, the said Samuel Richard Bosanquet, and occupied by your petitioner, the said Henry Boston, junior, and which moat forms a feature of interest and picturesque beauty, to which your said petitioners attach great value." Now this sluice is in the Copper Mill stream, is it not?

Witness: Yes, the sluice is in the bank of that stream, on the eastern side, on the property of the late Lord Maynard, which is now occupied, of course, by a tenant of the trustees. These tenants from time to time let off the water from the Copper Mill sluice for the purpose of irrigating their land. We have been asked to let the water out occasionally, and we have done it, but I cannot exactly say by whom the application has been made. I should imagine that Lord Maynard's tenants never think of asking us, because I should think they do it under the right which we acknowledge, and which we considered to be the only right existing in that sluice—the right to irrigate and water their lands. When the water has been so let out, it finds its way into the public carrier of the country, and it flows down that to beyond the lower landowners; it flows through the property of Mr. Bosanquet. It is a land-drain, receiving all the sewage of the neighbourhood, and so becoming excessively foul.

Mr. CLERK: But it becomes a picturesque feature, in Mr. Bosanquet's opinion, about his house, does it not?

Witness: It is a question of opinion, of course, whether a broad black ditch is a feature of interest.

Mr. CLERK: I presume that the East London Water-Works Company do not know how the right may be, whether Mr. Bosanquet has any right here or not?

Witness: I do not know how we are to determine anything further. I have always believed that the right was a right only in the hands of Lord Maynard's representatives or tenants. If it be a right it will be one which will be a matter of compensation in money, I should say.

The CHAIRMAN directed the attention of the learned counsel to the allegation in the petition that the withdrawal of this water from the petitioners is not essential for the objects professed by the bill, which can be equally well effected without interfering with the rights of the petitioners.

Mr. CLERK: Will you be so good as to explain how it is that any water which is now used by Lord Maynard's tenants will be prevented after your works are constructed, from being taken through this sluice?

Witness: It is perfectly clear that if we stop up the sluice——

Mr. CLERK: Why do you stop up the sluice?

Witness: To retain the water. We want to retain all the water. Of course the water from that sluice does not return again to the water which we use; it flows into a public drain and becomes polluted, and passes below the levels which we have action upon. We appropriate the water by blocking up the sluice. If there is any right existing in Mr. Bosanquet to have this water flow on to his land after it has been used by the other tenants of Lord Maynard, I should think that it could be met by money compensation.

The CHAIRMAN stated that it was unnecessary to go into these points, as the allegation to which he had already called attention was the only objection to the preamble of the bill.

Mr. CLERK: Is it necessary for you that you should have all the water which you can get for the purpose of filling your reservoirs?

Witness: I think it is. I do not at all see why this water should be left to run into a sewer and become polluted. We have no objection from those who have the right to let off this water—viz., the tenants on Lord Maynard's estate.

Mr. CLERK: The other work which is opposed is the making of that conduit from Chingford Mill-head down to your reservoir E. I am afraid I must go into a little detail as to the position of the East London Water Company with reference to their rights in the waters of the river Lea. I believe that under an Act of 1855 the whole of the waters of the river Lea——

The CHAIRMAN intimated that it would be better for the learned counsel to state to the committee the effect of the Acts than to take evidence upon this point from an engineer.

Mr. CLERK read and commented upon section 9 in the Act of 1855, and section 68 in the Act of 1850; also sections 11, 20, 23, 30, 59, 60, and 62 in the Act of 1855.

Examination continued: There were agreements entered into, I believe, subsequently for the carrying out of those clauses?

Mr. CLERK: Now, practically will the water which will be taken into this reservoir E, from the mill-head above Chingford Mill, be flood water?

Witness: That is the intention under the language of the Act, to take flood water from that channel into the reservoir; so far as any additional power is given by the Act, it will be so. The other company consenting, water may be taken from the ordinary running river from the mill. As far as the trustees of Mr. Hunt are concerned, we shall take no more water than we have a right to take with the consent of the New River. If the New River were to give their consent to our taking a quantity in excess of the flood water, we could not take it at the present time without destroying the value of the mill, which we are not at liberty to do. We should require an additional work in order to get at it, but we can take the water in the term of the Act as a right, but we have not the works whereby to take it. We ought to have exercised the power which was conferred upon us in 1855 of purchasing Chingford Mill, but we did not; we propose now to revive that power, and on that to buy the mill and the buildings and the property of the mill. The River Lea Trustees are the freeholders of the mill to Mr. Richard Hunt.

Mr. JOHNSON objected that if the lease were to be referred to it must be put in.

Mr. CLERK stated that he had the draft of the lease.

Mr. JOHNSON stated that he would not insist upon rigid proof, if a counterpart of the lease were produced.

Mr. CLERK: I believe that the draft of the lease was in your presence read over to the tenant of the mill, Mr. Hunt.

Witness: It was, in the presence of Mr. Hunt and his solicitor. The date of the lease is 1854; it was before the Act of 1855. The term is from the 24th of June, 1854, for 28 years. There is a clause in the latter part of the lease enabling the tenant to throw up the lease, if the trustees exercise their power of selling the water, or if the water is taken from him.

Mr. JOHNSON stated that the lease recited that there were disputes between the water companies and the River Lea Trustees, and that those disputes must be settled; and that if, after those disputes were settled, the quantity of water taken should be reduced by one-seventh, then it should be at the option of the lessee to throw up his lease, and that there were also other clauses.

Mr. CLERK: These disputes were in existence in 1854, and the Act of 1855 was passed for the purpose of putting an end to disputes between the New River Company and the River Lea Trustees. The clause to which my learned friend refers in the lease is this:—"Whereas there are disputes existing between the said trustees of the river Lea and the New River Company, respecting the amount or quantity of water which the said New River Company are entitled to abstract from the river Lea above Chingford Mill and similar disputes may arise with other companies, the said trustees of the river Lea have powers to take, sell, and dispose of the surplus waters of the said river to water companies and other persons, and to construct works for

the benefit of the navigation; and arrangements may hereafter be entered into between the said trustees and such companies or other persons for the execution of works, and also for the abstraction of the water from the said river above the mills and premises hereby demised. And whereas by means of the exercise by such trustees of such powers of selling and disposing of surplus water, the said trustees may reduce, or be instrumental in reducing, the water power of the said mill, or such water power may be or become reduced by means of a settlement of the said disputes with the said New River Company, either by agreement between the said trustees and the said New River Company, or by a legal decision in favour of the same or any other company, it is hereby expressly agreed by them, the said parties to these presents, that the said trustees of the river Lea shall and may enter into agreements with the said New River Company, or any other water companies or other persons or parties, for the abstraction of the waters of the said river above the said mill and premises; and the trustees may themselves abstract any such surplus waters by cuts, canals, borings, or wells, or in any other manner, without any claim for compensation on the part of the said Richard Hunt, his executors, administrators, or assigns, or interference by him or them in any arrangement which may be entered into by the said trustees and any water companies or other persons or parties during the continuance of this demise; nor shall the said Richard Hunt claim or be entitled to any compensation in case of a legal decision that the said New River Company or any other company are or shall be entitled to abstract an additional or increased amount or quantity of water above Chingford Mill. Provided always, that if at any time during the continuance of this demise the said trustees or the said New River Company, or any water company or other persons or parties under any arrangement as aforesaid, or under any legal decision as aforesaid, shall so abstract the water from above the said mill as to lower or reduce the fall or power due to the said mill at the date of the execution of these presents (such power being ascertained in manner prescribed by the River Lea Improvement Act, 1850, and stated in the report of the engineers, dated the 14th of May, 1853, deposited with the clerk of the peace as required by the said Act), beyond the amount of one-seventh of such power, the said Richard Hunt, his executors, admininistrators, or assigns, shall have full liberty to throw up this lease on giving six months written notice."

Mr. CLERK: That was in 1854, subsequently to this agreement containing the power of throwing up this lease if the water should be abstracted. This agreement was come to, was it not, in 1855, between the river Lea, on the one hand, and the New River and the East London Water Company on the other?

Witness: It was so. The River Lea Trustees having reserved the right to take the water from the mill when they sold the water, did sell the water, and consequently took away the water above the mill; and the company agreed to pay an annuity to the trustees in consideration of that among other things.

Mr. CLERK: Supposing that you, in dealing with the trustees, had bought their rights as trustees but did not touch their rights as millowners, would you have got anything in consideration of what you gave them?

Witness: No.

The CHAIRMAN stated that the committee could not decide the questions of right which were raised upon the construction of the Act and of the lease, and that the only question to be raised before the committee was, whether the water could be as well drawn from the tail of the mill as from the head of the mill.

Mr. CLERK stated that the Lands Clauses Act was incorporated in the bill, and that any right which Mr. Hunt had under his lease would be reserved to him.

Mr. CLERK: I will ask you, as the engineer to the scheme, why it is that it has become necessary for you to take this supply of water from above Chingford Mill?

Witness: My object in taking the water above the mill is that I may have the fall of the mill as a part of my reservoir depth. The reservoirs are arranged to be filled up at the level of the mill. The difference of level between the head and the tail of the mill, in the ordinary state of things, I should think is about 7 feet. We can get 7 feet by drawing from the head instead of the tail. Our reservoir is to be 100 acres. I raise the level of the reservoir banks to retain that greater quantity of water.

The CHAIRMAN: You get out 7 feet above the level of the ground on which you propose to make the reservoir?

Witness: Yes; there is a further fall between the tail of the mill and the next mill below, which is lost in the friction of the water.

Mr. CLERK: Do you contemplate buying up the mill and getting rid of it?

Witness: That must follow according as circumstances turn out. I propose to take the water under the right which the freeholder has now, which right I propose to buy. I propose to take the water from the head of the mill. If the mill is damaged, there is the lease, which is a very proper one. The whole of this was considered, and it was all thoroughly provided for before this lease was entered upon, and now we are going to fructify what was then intended; and whatever rights Mr. Hunt may have under that lease he will be compensated for under the Lands Clauses Act, but the rent which he pays for the mill was adjusted in consideration of what might occur.

The CHAIRMAN stated that the clause which Mr. Clerk had read was full of complications which the committee were not called upon to decide, and that Mr. Hunt's right was reserved in the Act by clause 10.

Mr. CLERK: As a matter of supply, do you consider it, as an engineer, for the reasons which you have given, necessary to take the supply from Chingford Mill-head, and not from the tail?

Witness: It is necessary.

Mr. CLERK: Would your reservoir be very much less effectual if you took it from the tail?

Witness: The loss of not being able to fill up to the higher level would be a very great loss.

Mr. CLERK: It was part of your scheme last autumn, I believe, to have extended your intercepting drain in various directions?

Witness: It was.

Mr. CLERK: That was opposed, I believe, by different parishes—Enfield and Tottenham; and also petitioned against by the Metropolitan Board of Works. They are the only parties appearing upon that point now, so I will call their attention to what they say in their petition—"That the works proposed in the bill are defective in their engineering details, and will not be efficient for their proposed object. That the works contemplated by the said bill are not, your petitioners submit, sufficient to purify the water of the river Lea within the metropolis, and that to be effective they should be of a more comprehensive character." You have seen a report of their engineer, Mr. Bazalgette, to that effect?

Witness: Yes; I have seen Mr. Bazalgette's report.

Mr. CLERK: This is the passage, I believe, to which I refer—"The sewers or drains to be built under this bill at the nearest point will be about 5 miles beyond the jurisdiction of this board." In consequence of this report of Mr. Bazalgette's, and also of the opposition of other parties, and the report of the Rivers Pollution Commission, you struck out all those powers of making additional intercepting drains, did you not?

Witness: Yes; because they would interfere with the nine comprehensive schemes which are advised by the Rivers Pollution Commission, and which are recommended by Mr. Bazalgette himself in his own report to the Metropolitan Board of Works.

Mr. CLERK: When those powers had been struck out of the bill, notice was given to the Metropolitan Board of Works that that was the case?

Witness: It was.

Mr. CLERK: I see that your company have received a letter from the Metropolitan Board of Works, signed by their solicitor, dated the 20th of May, which Mr. Hope Scott has already read—"The committee of the board has to-day again considered this bill, with the various amendments and alterations which you propose to make. The feeling is very strong that the advantages which were held out for Parliament giving the powers ought not to be withdrawn; and that, as the neighbourhood would benefit by the works now to be withdrawn, the board decline to withdraw their petition, as they must submit that works ought to be carried out if the other powers are to be given; but that, if the old clauses are not restored, the bill ought not to pass." Now, there is one other matter which you propose to do, and for which some additional clauses have been inserted and are now before the committee—that is, for an alteration of the works at Old Ford?

Witness: There are additional works, and an alteration of the old works at Old Ford.

In answer to the CHAIRMAN, *witness* said that the evidence which he gave before the committee on a former occasion was correct, and explained the present case.

Mr. CLERK: You are now putting up additional engines and pumping power at Lea Bridge?

Witness: We are now erecting engine power at Lea Bridge, and laying additional main-pipes, to carry the water which those additional engines will pump into London. The estimate for the works which we propose to retain in the bill as it now stands is £160,000, and that will give us an additional available supply of 300 million gallons or more, with additional filtering-beds and certain other subordinate works.

Cross-examined by Mr. CRIPPS: I was the adviser of the East London Water-Works in the scheme which they are proposing here. It was part of the scheme that there should be intercepting sewers, to aid in the purification of the river Lea, for the purpose of enabling us to supply purer water where we drew our source of supply. I thought those intercepting sewers were a valuable part of the works. I have at a former time put in some intercepting sewers up to a certain height in the stream, and I have found the good effects of that.

Mr. CRIPPS: Are you aware that the Metropolitan Board of Works objected that your intercepting sewer was not sufficiently extensive for its purpose?

Witness: Yes; I think that was the form of their objection.

Mr. CRIPPS: Did you really suppose that it could be satisfactory to the parties who suggested that that sewer was not sufficient for its purpose to say, "Then we will do nothing at all"?

Witness: Not at all.

Mr. CRIPPS: But that is what you have done, is it not?

Witness: Not at all. The pressure of circumstances induces us to withdraw the application for power to make these drains, because that power will evidently be conflicting with some other powers which are soon to be created. We could not make them more comprehensive, and it is for the committee to consider how the condition of things stands. I consider that those intercepting sewers were an essential part of our scheme. The company do not run away; they are there to make other works if they are necessary. Our object by this bill is to take water and impound it. The intercepting sewer at present ends a few hundred yards beyond Enfield Mill. It is carried sufficiently far to intercept the drainage of a small district above the mill.

Mr. CRIPPS: Then, excepting so far as the Enfield Mill goes, there is nothing at the present time to prevent the sewage of all the towns that are above that part of the Lea from coming to the Lea?

Witness: Except so far as a little above Enfield Mill is concerned, there is nothing to prevent the sewage of all the towns above that part of the Lea from coming into the Lea.

Mr. CRIPPS: How far is it essential to your present scheme that that intercepting sewer should be carried up to intercept the drainage?

Witness: As far as the town of Waltham Abbey on one side, and up to the neighbourhood of Waltham Cross on the other side.

Mr. CRIPPS: How many miles, in the first instance, is it from where your intercepting sewer terminates at present up to Luton?

Witness: I think it is 36 miles.

Mr. CRIPPS: And taking the other branch, how far is it from the junction to Bishop's Stortford?

Witness: From the point at which we take the water out of the river, which is 3 miles below Enfield Mill, it is 25 miles to Bishop's Stortford, and 36 miles to Luton, which is a town of 20,000 inhabitants. I believe the whole of the drainage of Luton drains into the Lea, as far as it drains anywhere. All country towns do not drain. There is a very partial drainage. I believe there was some attempt at clarifying the sewage at Luton. I believe there is a good system. It is spoken of as a very well managed works.

Mr. CRIPPS: That process improves it, as far as the solids are concerned, but allows the fluid to remain sewage, and if allowed to stagnate it would become putrid and offensive.

Witness: Yes.

Mr. CRIPPS: Passing a little lower you come to the town of Hatfield.

Witness: Yes. That is a town of 4300 inhabitants. The sewage of that town does not come to the Lea. I believe it is carried into a special system of "dumb wells," by which the sewage is not allowed to go into the river at all.

Mr. CRIPPS: Is this the fact: "The plan for the disposal of the sewage was adopted with a view to its complete exclusion from the river, but it is essentially a 'dumb-well' system, and the effect must be more or less to pollute the subsoil water, which, after passing through the chalk or gravel, subsequently finds its way to the river"?

Witness: It is rather an uncertain view to take. I know Whitwell; that is not on the Lea.

Mr. CRIPPS: Is this true: "Whitwell is a place where privies hang over the water, and in Welwyn the whole of the sewage runs in. To a certain extent, also, the river is polluted by sheep-washing, which is carried on upon a large scale. The preparation used for dipping sheep contains arsenic;" and so they go on to speak of that?

Witness: They are within the truth, of course; they are all fair descriptions.

Mr. CRIPPS: Has the district above Hertford something like a population of 73,000 persons?

Witness: I make it rather less, but it is somewhere thereabouts.

Mr. BENYON: Does the sewage of 73,000 people drain into the river Lea above Hertford.

Witness: I must except to that. The 73,000 people is the whole rural population away to the outer watershed of the valley. That is the whole population of the watershed, not of the towns. That includes the whole population out to the watershed line, the opposite side of which watershed line runs away to the Ouse and the Colne.

Mr. BAILLIE inquired whether there was any complaint as to the purity of the water where it starts from the New River at Hertford.

Mr. CRIPPS stated that the commissioners' report distinctly showed that it was not pure. Now let us take the middle district, from Hertford down to Ponder's End; that would be above where you draw from, would it not?

Witness: It would.

Mr. CRIPPS: The town of Hertford, which has about 7000 inhabitants, has a complete system of drainage.

Witness: It has, very thoroughly carried out. The sewage flows into tanks about a mile below the town, on King's Mead.

Mr. CRIPPS: Is this true: "On approaching these works we feel at once that we are in a region abounding in night-soil, and an examination of the tanks displays a vast quantity of human ordure. The sewage is here filtered, and the liquid flows by a channel constructed for the purpose into the river at a distance of about 1000 yards"—is that the case at Hertford?

Witness: It is the case, except so far as the works are enclosed within a very high bank. I never smelt the sewage anywhere outside the bank. A man must have a very long nose to smell it.

Mr. CRIPPS: Is Ware a town of 6000 inhabitants?

Witness: I believe it is.

Mr. CRIPPS: Is it the fact that "upwards of 220 water-closets, as well as household drainage," are discharged into its sewers?

Witness: The general drainage of the town of Ware passes into the Lea, but the number of closets or cesspools I have no means of knowing. I imagine the commissioners have inquired properly into it.

Mr. CRIPPS: Is this fact true: "This sewage" (speaking of household water-closets), "without any liming or other sort of treatment, is passed direct into the river by several outlets—an arrangement which tends to diminish the local nuisance, but does not diminish the total amount of pollution caused to the river"?

Witness: Yes, that is the case.

Mr. CRIPPS: The principal town on the river Stort is Bishop's Stortford.

Witness: It is the most populous place on the river, and is a town of 5000 inhabitants.

Mr. CRIPPS: Is this the fact there: "Drains are general throughout this town, though main sewers have not been laid down on any proper system; these drains receive and discharge into the river the sewage refuse of the streets, houses, and other places, as also the contents of upwards of 300 water-closets"?

Witness: Yes, I should think that is true. I have visited Stortford many times.

Mr. CRIPPS: Is this report also true as to that town: "Arriving at the lower end of the town the sight I witnessed was sickening. The river was covered by large masses of black filth, which I believe is only to be found in open sewers. It is generated at the bottom, and when a certain period of its growth is reached it appears to obtain greater buoyancy, its hold upon the mud is relaxed, and it rises to the surface. The whole town, a considerable one, is drained directly into the river. Long rows of privies overhang the banks; large masses of excrement, in many cases not less than half a ton, are sliding into the water, the lower part being washed away, and the weight above constantly pressing down that below to become mingled with the water. I do not at all exaggerate when I say that the water in the river is quite as bad, or really worse, than that in the high-level sewer which drains the northern portion of London." What do you say to that?

Witness: No doubt the sewage of Bishop's Stortford is nearly deleterious to the river. I think the water in the neighbourhood of Bishop's Stortford is worse than it is anywhere else. It is a town which requires to be dealt with more than any one of the whole series of the river Lea system. I do not dispute the pollution of the water in the neighbourhood of Stortford.

Mr. CRIPPS: Now, taking the second division of the river from Hertford to the place where the intake of your stream is at Ponder's End, would that comprise a population of 79,000 persons?

Witness: I do not think it is so much, but it is not very much below it. It may be about 65,000.

Mr. KEKEWICH: Is the highest intake up the river at Ponder's End?

Witness: The river is purified beyond Ponder's End; it is equivalent to its being there. The water is purified from there downwards by the diversion of the sewage.

Mr. CRIPPS: Is Ponder's End your highest intake up the river?

Witness: I was just saying that from Ponder's End downwards all the sewage is diverted, but the intake is not locally there.

The CHAIRMAN: The intake is at Tottenham, and the intercepting sewer goes up as high as Ponder's End?

Witness: Yes.

Mr. CRIPPS: You have no intake higher up than Ponder's End?

Witness: Just so.

Mr. CRIPPS: The only difference that comes in at Ponder's End is that your intercepting sewer comes up to there?

Witness: Yes.

Mr. CRIPPS: But where you take the water from is considerably lower than Ponder's End?

Witness: The local site of the intake is three miles lower down. It is situate upon what in the report is called the lower district of the river Lea.

Mr. KEKEWICH: Then what is the meaning of the report of the commissioners when they say "The middle district, lying between the commencement of the New River, at Hertford, and the intake of the East London Water Works, at Ponder's End, comprises a population of 79,000 persons"?

Witness: The words are not exactly correct, but the meaning is quite correct. If the intake were there it would be no better than where it is.

Mr. HEADLAM: No sewage is let into the river below Ponder's End?

Witness: No.

Mr. CRIPPS: The report says: "The lower district commences from the intake of the East London Water-Works Company, at Ponder's End." In fact it should be: "The lower district commences from where the intercepting waters are at Ponder's End." That would be more correct, would it not?

Witness: It would.

Mr. CRIPPS: They state: "From this point the river ceases to be a source of water supply, and becomes, in a great degree, like an open common sewer." And then there are various amplifications of that statement, but it is in its course where it is so described that your intake is situated—that is to say, in the lower district?

Witness: No; the lower district, I imagine, begins at the point where the intercepting drain discharges itself.

Mr. CRIPPS: Let us take Ponder's End as the point, whatever it means; supposing the lower district is described as commencing at Ponder's End, then your intake of water is from the lower district?

Witness: Yes.

Mr. CRIPPS: This is a report made by the chairman:—"Your committee find, from personal inspection, that the water, before it reaches the filtering-beds, is polluted in a most disgusting and abominable manner by drainage from land, overflow from cesspools, privies, factories, piggeries, &c., from the towns and places just before mentioned." That is a report from a committee, signed by Mr. Leman, the chairman of that committee, to the Board of Works for the Poplar district. Then the summary of the other report to which I referred is as follows:—"That the water of the East London Water-Works Company is polluted to a very large degree by the drainage of the towns and villages upon the banks of the river Lea, from whence they draw their supply. That an abundant quantity of water, even of the character at present supplied, is not to be obtained in the summer, without storing it for several months in open ponds. Lastly, that pure water, in sufficient quantity for the present and probable future wants of the district, cannot be obtained, in my judgment, from the present source of supply at all." How far do you agree with those reports?

Witness: I do not agree with the latter conclusion at all. I admit that within the area of the river Lea there are sources of pollution, as there are upon all rivers. The object of our intercepting sewer was to remedy the most glaring of the defects and impurities in the river, and it entirely intercepted a very large proportion of the towns, such as Edmonton, Enfield, Hornsey, and Barnet.

Mr. CRIPPS: As to what you consider the worst damage, you had a scheme for intercepting that, had you not, which you have now dropped?

Witness: That is merely a technicality.

The CHAIRMAN: How do you mean a technicality; is it not rather a reality?

Witness: Because we are anticipating something more comprehensive; we do not withdraw it because we wish to escape from it, but because we see imminent a better arrangement of a more comprehensive character.

Mr. PEMBER: I think that you have said that one great object of your bill is to take more water from the Lea than you have hitherto taken?

Witness: I do not know that I have said so, but that would be the effect of the gradual progress of the company.

Mr. PEMBER: Is not that the object of your bill?

Witness: The object is to make the sources more secure, and to some extent purer.

Mr. PEMBER: What do you mean by making the sources more secure?

Witness: Having a good store of water in hand?

Mr. PEMBER: Do you propose by the works to be authorized by this bill to take more water from the Lea than you have hitherto taken?

Witness: Not to take more water than we had power to take. The taking of more water is a necessary flow of circumstances. The company has a continual growth, and more and more water is taken every year. The daily flow of water down the Lea that we have taken away has been 20 million gallons, roundly stated, in the last year. We have no particular immediate necessity for increasing that quantity, but, if the supply of our district calls for it, we shall give it if we have it. We contemplate power to take more than 20 million gallons a day. At present we take the supply from below Chingford Mill. There is an escape-weir at Chingford Mill-head. There is a weir out of Chingford Mill, which keeps the water up. There is no weir between Chingford Mill-head and the navigable part of the river Lea. There was one, but it has been removed. Hitherto, in taking our water from below that weir, we have never been enabled to draw down a head of water above the weir. We would do so now, perhaps. I do not know, at this moment, the fall between the navigation and the Chingford Mill. There is no weir there at all.

Mr. PEMBER: Do you happen to know what the minimum dry weather flow of the river Lea is at that point? Is it not 40 million gallons a day of 24 hours?

Witness: I wish it was so much.

Mr. PEMBER: That is the figure given in the report of the Rivers Commissioners. Is it correct?

Witness: It is not correct.

Mr. PEMBER: What is the minimum dry weather flow of the Lea at the point where the cut that comes down to Chingford Mill runs out of it? At Ponder's End Lock, what is the minimum dry weather flow of the water?

Witness: The extreme minimum of the driest seasons we have had would be somewhere about 20 million gallons.

Mr. PEMBER: What section of the Act of 1855 gives you the power of taking further water, provided you can pump it back by steam power?

Witness: I am not quite sure whether that is in the Act, or in an agreement appended to the Act.

The CHAIRMAN: Is it proposed to alter the rights of the trustees under section 30?

Mr. CLERK said there was no such intention. It was proposed to insert in the bill clauses to preserve all the rights of the River Lea Trustees in the waters of the Lea, and that nothing would be done under the bill to diminish the rights of the trustees in those waters.

Mr. PEMBER submitted that however the Act of Parliament might be framed, there was the question whether if any more water were taken it would not interfere with or endanger the navigation of the river, and whether any abstraction of the water above would not make the water below more polluted.

The CHAIRMAN stated that if certain rights were given by section 30 of the Act of 1855, all that the River Lea Trustees could do was to see that those rights were reserved by this bill, they being of course entitled to appear as owners of the mill which it was proposed to take under compulsory powers.

Cross-examined by Mr. JOHNSON: You do not seem to concur with my learned friend, Mr. Hope Scott, that the object of this work, letter N in the works to be authorized, was entirely (using his own language) "for flood water, and for no other purpose"?

Witness: So far as the new powers of the Act go, they apply to flood water. By purchasing the water we acquire the power which is now in the freeholders hands.

Mr. JOHNSON: But irrespective of the power of purchasing the mill, if you execute these works, that is to say, if you make this conduit below the present head level of the mill-dam, and cannot convey the water to a reservoir at a distance, it enables you, without purchasing the mill, to appropriate a great deal of water that at present supplies the mill, does it not?

Witness: There is the physical power of taking the water.

Mr. JOHNSON: And that would be a great deal more than the mere flood water, which, of course, would be of no use to the mill?

Witness: Yes.

Mr. JOHNSON: Then I say you do not agree as to the object of the bill with my learned friend who opened the case for the promoters.

Witness: The object of the bill is to take the flood water from the head of the mill, but the purchase of the mill will put us in the freeholders shoes.

Mr. JOHNSON: You take power to purchase the mill, but we cannot compel you to do it. You give us notice, and those are the only circumstances under which they can compel you to take the mill.

Witness: We shall be happy to be compelled to purchase it. We have been ready to purchase it before now, but the trustees have said there was a disability in the matter, otherwise it would have been concluded long ago.

Mr. JOHNSON: You would have the power, without purchasing the mill, of executing the works which you are seeking parliamentary authority to make, would you not?

Witness: I suppose that is so.

Mr. JOHNSON: How much would that reduce the head level of the mill? Would it be something like 5 or 6 feet, supposing you exercised to the maximum the power which you obtained by the construction of this conduit?

Witness: I cannot say; I might draw the water considerably. I do not think I could reduce it so much as that with the works I am proposing. If I draw the water out of the head, and have not got in the tail, you know—I am at present taking it from the tail, and if I take it from the head by another channel, I have not got it in the tail to receive.

Mr. JOHNSON: If you take it from the tail it would not affect the mill at all, but if you take it from the head it immediately affects the mill.

Witness: Yes; but gallon for gallon it is just the same above or below.

Mr. JOHNSON: What does this bill give you the power of reducing it below the present level of the mill-dam—is it 5 or 6 feet?

Witness: It depends upon the magnitude of the channel by which I should draw it.

Mr. JOHNSON: Will you destroy the means of working this mill by the abstraction of the water over which you take power?

Witness: I may seriously detriment the power of working the mill.

Mr. JOHNSON: But will you not destroy the means of working the mill by water power?

Witness: Yes; I suppose you may so interpret it, I had not intended the channel leading out of the mill-head to be of a size to do it, but I suppose I am limited in the size I may make that channel.

Mr. JOHNSON: Would you be content that we should insert a clause that you should take only the flood water?

Witness: No; because why am I not to purchase the right which the freeholder has? I suppose I may agree to purchase the mill if I take more than the flood water.

Mr. JOHNSON: Assuming that we retain the mill, will you be content to appropriate for the use of the water company merely the flood water?

Witness: You are the leaseholder.

Mr. JOHNSON: I am the leasholder till 1882—that is 15 years more.

Witness: I propose to purchase the freehold, and acquire the freeholder's right to take the water.

Mr. JOHNSON: Are you content to be limited to the appropriation of the flood water?

Witness: Not at all.

The CHAIRMAN: Can you fill the additional reservoir of 300 million gallons by merely drawing off the flood water from the mill-head, or without using the ordinary flow through the mill race?

Witness: I do not think that I should get the full benefit of my reservoirs by limiting myself only to the flood water altogether.

Mr. JOHNSON: You would not keep your reservoir as full as would be necessary for the purposes for which this bill is promoted?

Witness: Yes.

Mr. HEADLAM: In point of fact, you would take more than the flood water.

Witness: No doubt.

Mr. BENYON: You could not fill the upper part of your reservoir if you did not take it down the ordinary height of the mill-head.

Witness: Just so.

Mr. JOHNSON: If you take it from the mill-tail and substituted steam power for the natural motive power of gravitation, you could then take it from the mill-tail, could you not, and force it into the reservoir by artificial means, instead of allowing it to flow by natural means.

Witness: Yes.

Mr. JOHNSON: What would be the cost of a steam-engine for that purpose, forcing it from the mill-tail instead of the mill-head?

Witness: I cannot say.

The CHAIRMAN: What is the mill?

Witness: A flour-mill.

Mr. HEADLAM: Would it not be cheaper to put a steam-engine into the mill?

Witness: Far cheaper.

Mr. JOHNSON: Would a steam-engine from the mill be less costly than a steam-engine to force the water to the reservoir from the mill-tail?

Witness: I should think it would be a better adaptation of power. I do not know whether it would be more costly.

Mr. JOHNSON: Do you understand my question—that instead of the steam power being put into the mill by the millowner, the steam power should be applied to forcing the water from the reservior by artificial means?

Witness: It would be a great deal better to compensate you for the damage. I believe Mr. Hunt has been for many years in possession of the mill. I know that money has been spent upon the mill, but whether by the leaseholder or by the freeholder I do not know. I cannot say whether a large sum has been expended since the Act of 1865. I should think so. I have seen works going on there; I have seen them building a new wheel. I assume that we are to have the power of appropriating any quantity of water we may think proper, so that we leave enough for the navigation.

Mr. JOHNSON: Without the works which you seek parliamentary authority to carry out under the present bill, have you the means of appropriating any such water?

Witness: I believe not.

Mr. JOHNSON: There are no physical or legal means.

Witness: I believe not.

Cross-examined by Mr. HENRY JAMES: I am acquainted with the locality of Low Hall Farm, and I am aware of the manner in which this water runs through this open drain from the small Copper Mill stream, and down below Low Hall Farm. I have been acquainted with the neighbourhood and the channels for the last sixteen years. The stream runs through the lands of different parties, besides Mr. Bosanquet's. I cannot say whether the water there has been used for agricultural purposes. It is very dirty. There is still a sluice, by which the water may be allowed to pass out of Copper Mill-head. There has been a 6-inch pipe placed there recently, and there is a sluice on the pipe. I call a cock a sluice. The company have the key to open it. I believe that there is another key, but the company have the original. If there is a copy key it is surreptitiously made and kept. I believe that the marsh bailiff is not the person appointed by the Commissioners of Sewers. I do not know that he has possession of a key. The key was always kept by the owner of the mill. A man has been in the habit of opening the sluice with the key regularly. I do not know his name. It is some one connected with Low Hall Farm, I believe. We have never applied to him to have the key back. We have gone and shut the sluice again. Objections have been made by some of my men, especially the man who has the charge of the proper key. The water, as far as I know, whether it has been opened by one person or another, has flowed down the sluice or open drain. We propose by the bill to take the whole of that supply away. The water which issues from this sluice is in general but a very small proportion of the water going down the public drain. I do not propose to compensate for taking one water by making another.

Mr. JOHNSON: If the water which will be taken by this act is taken away, what water will be found on those farms for agricultural purposes?

Witness: No new water. They have the water of the other drain. That goes through Mr. Bosanquet's land, because it flows into it. We are not going to interfere with the other drain; we may alter the course of it a little. The other drain is the main drain.

Mr. JOHNSON: Do you mean to represent that that is a supply of water going through the farm, either for agricultural or for any purpose?

Witness: Yes, there is a considerable supply of water. The upper end of the stream is Heigham Hill. A considerable extent of country drains into the other drain, except this one. In summer time there is a good and sufficient supply of water in that drain. I do not recollect ever seeing it dry. We should remove the sluice by our new reservoir.

Mr. JOHNSON: Apart from this question of your losing so much water, would there be any physical obstacle to your giving the water by means of pipes, tapping the Copper Mill stream above or below your suggested reservoir.

Witness: Apart from the question of the propriety of our doing so, there would be no physical difficulty. The only objection would be the loss of so much water. I suppose that the flood-gates near Low Hall Farm are the property of the farm. They are used to dam up the water—all the water which is helped to a small extent by means of this sluice.

Re-examined by Mr. CLERK: My learned friend, Mr. James, rather assumes that the whole of the water running down this drain past Low Hall Farm, is water running through those iron pipes from Copper Mill-head. Is that the case?

Witness: Not at all. There is a drainage from the large area there. The issue from the mill-head comes through a private drain and then falls into a main drain, and goes down the country, and is liable to be fouled with the farm refuse, and so on.

Mr. CLERK: How often in the week is this water taken?

Witness: The old water right limits it to once a week—I think from Saturday night to Sunday night—for the benefit of Lord Maynard's tenants.

Mr. CLERK: Until the key was made by some gentleman, I believe notice used to be given to your servants to open this sluice at the time.

Witness: The key formerly was kept at the mill, and some man went there and asked for the key, and they went up on Saturday night and opened the sluices and brought the key back on Sunday night, having shut the sluice. I believe that the man came from Low Hall.

Mr. CLERK: Have you any idea what proportion the stream running out of this mill-head into the main drain bears to the whole drainage of the land going down to drain?

Witness: A very small proportion at times; but, of course, if there were an out-and-out drought the proportions would vary.

Mr. CLERK: To come from that to the opposition of the Metropolitan Board of Works, if you were to carry out what is suggested by Mr. Cripps, you would have to carry intercepting drains for a distance of 40 miles on either side of the Lea up to Luton, and about 25 miles up the Stort on either side of the river to Bishop's Stortford, and perhaps beyond, would you not?

Witness: I am not quite sure whether the learned counsel made that his proposition, but if interception were carried to that extent of course it would be something of that kind. The whole area would have to be drained, in order to remove sewage matter effectually from the Lea.

Mr. CLERK: I believe that one of the things which deterred you from proceeding with the small scheme of intercepting which you proposed was a report of Mr. Bazalgette's to certain parishes, suggesting a large drainage scheme for the whole watershed.

Witness: That was one of the reasons. Mr. Bazalgette's report or plan will go far beyond what I recommended. [The plan was handed in.]

Mr. KEKEWICH: Where is the outlet of that main drain?

Witness: Mr. Bazalgette proposes to carry it to some outlet at the metropolitan drainage at Barking Creek, or to intercept a great deal of the drainage of Essex, all the valley of the Lea, and a shoulder of the county of Essex, which drains into the Lea and the Thames.

Mr. CLERK: Could you, on behalf of the East London Water-Works Company, have had the means of making any such outfall as that which is proposed by Mr. Bazalgette?

Witness: Not at all. It is a much more comprehensive scheme than we could contemplate, or find any interest in.

Mr. CLERK: And would it be a scheme dependent upon the greater drainage scheme, and carried out in connexion with it?

Witness: It would have to be carried out by the establishment of some new commissioners, I imagine, or by some much more comprehensive system and power than we have any chance of obtaining.

Mr. CLERK: I believe that when the Rivers Pollution Commission recommended a board of conservancy, for the purpose of purifying the rivers, you considered that the very small works undertaken by you would rather conflict with such large powers conferred upon the conservancy board?

Witness: Yes; I consider that now that would be the effect of creating this power.

Mr. CLERK: They might be inconsistent with such a system as is proposed by Mr. Bazalgette, or with any which the board of conservancy might propose.

Witness: Yes.

Mr. CLERK: Such an idea as that of making the water company divest all the sewage from the river from which it draws its supply was not thought of in the case of the Thames companies, was it?

Witness: Not at all; the idea is preposterous. They are not the sinners who produced the mischief.

Mr. CLERK: If Mr. Cripps's idea on the part of the Metropolitan Board of Works is carried out, the Thames companies ought to have made an intercepting sewer between Reading up to Thame, ought they not?

Witness: Yes; that would be parallel reasoning.

Mr. CLERK: A complaint is made that you have dropped your intercepting sewer, which the Metropolitan Board of Works complained of as an imperfect scheme. I suppose that you are most desirous to see the report of the Rivers Commissioners carried out, and to see a board of conservancy established to divert all the sewage from the Lea?

Witness: Yes. I approve on the whole of the recommendations which the Rivers Commission have put forward. I think they have put the matter in a very correct light, and I do not see, on the whole, any better plan of tackling the difficulty than that which they have proposed.

Mr. CLERK: There is one point on which, I think, there was a little misapprehension on the part of my learned friend. In the report they speak of your supply being taken at Ponder's End. They say: "The lower district commences from the intake of the East London Water-Works Company at Ponder's End." Your water is as pure as it is at Ponder's End, but you do not take at Ponder's End, but at Lea Bridge.

Witness: Strictly speaking we do not take it there; virtually speaking, however, we may be said to take it from the Ponder's End point.

Mr. CLERK: Then they go on to say: "From this point the river ceases to be a source of water supply, and becomes, in a great degree, like an open common sewer."

Witness: At the foot of Tottenham Lock is the outfall of the Catchwater Dyke. With regard to the River Lea Trustees, we do not wish to interfere with them at all. The interest in the Chingford Mill of the Messrs. Hunt exists under a lease granted in the year 1854. We are prepared, on the part of the East London Water Company, to recommend that they should put themselves in the position of the Lea Trustees as the lessors, so as to give all compensation to the tenants to which they may be entitled under that lease. Whatever rights the present lessee has against his lessor, we are ready to accept and to give them full compensation for any rights which they have now, either at law or as qualified by their lease. By taking the flood water we should not interfere with the working of the mills; we should improve it decidedly. Every drop of water taken from the head would tend to the benefit of the tail. I think it will be better to buy those mills and quash them, than to perpetuate them by the creation of compensation power.

The CHAIRMAN: Have you any estimate of the several works which you propose to construct, separately?

Witness: Yes, to some extent, separately.

The CHAIRMAN: Can you give an estimate of the works, distinguishing the items?

Witness: The estimates, of course, include a considerable amount of land, but including the land in the sections of the works, for works under letter A and other letters subsequent to A, for the filter-beds at Lea Bridge, the estimate is £32,000. The estimate for the works D is £47,000—that is the reservoirs south of those already made. The works E, which are the reservoirs north of those already made, will cost £58,000. The works N are to cost £11,875. The sundry other works and property make up a remainder of £15,525.

The CHAIRMAN: What is the difference of the level of the water at Tottenham between the New River Company's reservoir and your reservoir?

Witness: Chingford Mill is a whole river mill. Below Chingford Mill the river divides into two portions, which by a special contrivance have been made equal. Half the river goes to what was formerly the Copper Mill, and half goes to the Tottenham Mill. On the level of the Copper Mill are our reservoirs. The Tottenham Mill belongs to the New River Company. The New River pumping-engine is built to draw the water from the level of the tail of the Copper Mills. Our reservoirs are on the head of the level of the Copper Mills, so that there is six feet difference. We are above the level from which their suction draws the water.

The CHAIRMAN: Is that above the level of the New River itself at that point?

Witness: The New River is 70 odd feet higher than that. It starts from near Hertford, and preserves a high level in order to take the water into London as high as it can.

The CHAIRMAN: Then when you speak of the Tottenham pumping-station, that is assuming that the New River Company drew the water from the river Lea at Tottenham?

Witness: I thought that that was what you were alluding to, because that is the only engine they have. I do not know to what extent the engine

Share List of Metropolitan Gas Companies.

No. of Shares issued.	Amount per Share.	Name of Company.	Amount paid up per Share.	Div. per Cent. per Annum.	Price per Share.
	£		£ s d	£ s d	£ s d
8000	10	Anglo-Romano . .	10 0 0	9 0 0	11 to 12
5000	20	Bahia (Limited) . .	20 0 0	nil.	16 10 0
1000	20	Do., preference .	20 0 0	10 0 0	27 10 0
750	20	Do., do., redeem.	10 0 0	10 0 0	12 10 0
40000	5	Bombay (Limited).	5 0 0	5 0 0	4½ to 4¾
10000	5	Do., third issue .	3 0 0	5 0 0	3½ to 3¾
10000	20	British, Limited . (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton (Potteries), Trowbridge, & Holywell.)	20 0 0	6 0 0	28 to 29
12000	50	*Chartered*	50 0 0	8 10 0	54 to 55
6000	50	Do.	35 0 0	8 10 0	37 to 38
10000	20	*City of London*, A shares	20 0 0	8 0 0	24 to 25
10000	10	Do., B shares	10 0 0	4 0 0	6½ to 7
8000	10	Do., new shares.	10 0 0	8 0 0	11½ to 12½
25000	25	City of Moscow (L)	25 0 0	£7 intr.	15½ to 16½
17490	25	*Commercial* . . .	25 0 0	10 0 0	31 to 32
2500	20	Continental Union.	20 0 0	8 0 0	14 to 15
17500	20	Do.	15 0 0	8 0 0	9 to 10
10000	20	Do., preference .	20 0 0	7 0 0	
5827	5	County & Gen. (L)	5 0 0	nil.	
2000	5	Do., preference . (Pater, Pembroke, Ely, Lea Bridge, Northfleet, Walton, & Ware.)	5 0 0	nil.	
5000	10	*Crystal Pal. Dist.*	10 0 0	10 0 0	13 to 14
5000	10	Do., preference .	10 0 0	6 0 0	12½ to 13
10000	10	Do.	2 10 0	7 0 0	2½ to 3
4000	50	*Equitable*	50 0 0	10 0 0	66 to 67
4000	25	Do., new shares.	25 0 0	10 0 0	33 to 34
23406	10	European (Lim.) .	10 0 0	10 0 0	13 to 13¼
12000	10	Do., new shares. Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	10 0 0	6¼ to 6½
20000	10	*Gt. Cent. Gas Cons.*	10 0 0	10 0 0	12½ to 13
5000	10	Hong Kong (Lim.)	10 0 0		8 to 10
26000	50	*Imperial*, old sh.	50 0 0	10 0 0	66 to 67
1300	100	Do., bonds . . .	£100	10 0 0	170 to 172
2391	25	Imperial Austrian.	25 0 0		
28000	50	*Impl. Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwp., Bordeaux, Brussels, Cologne, Frankfort-on-M., Haarlem, Stolberg, Toulouse, & Vienna	43 15 0	16 0 0	95½ to 96¼
400	100	Impl. Mexican (L.)	75 0 0		
3000	40	*Independent* . . .	40 0 0	10 0 0	53 to 56
3000	10	Do.	10 0 0	5 0 0	7 to 9
3000	20	Do.	12 10 0	7 10 0	13 to 14
7133	50	*London*	50 0 0	10 0 0	62 to 63
5610	25	Do., 1st pref. .	25 0 0	6 0 0	25 to 26
503	50	Do., 2nd pref. .	50 0 0	6 0 0	
214	50	Do., 3rd pref. .	50 0 0	6 0 0	
18781		Do., 1st pref. sh		6 0 0	
11828		Do., 2nd pref. sh		5 0 0	
12000	5	Malta & Medit. (L.)	5 0 0	4 0 0	3¼ to 4
6000	5	Do., preference .	5 0 0	7 0 0	5 0 0
30000	5	Oriental, Calcutta	5 0 0	8 10 0	5¾ to 5½
30000	5	Do., new shares.	1 0 0	8 10 0	1 to 1½
10000	5	Ottoman (Limited)	5 0 0	nil.	1½ to 2½
10000	10	Pará (Limited) . .	10 0 0	6 0 0	9½ to 9¾
27000	20	*Phœnix*	20 0 0	10 0 0	26 to 26½
3600	100	Do., new	25 0 0	7 10 0	24½ to 25½
144000	Sk.	Do.	100 0 0	5 0 0	70 to 71
5000	20	*Ratcliff*	20 0 0	10 0 0	22 to 24
	20	Rio de Janeiro (L).	20 0 0	10 0 0	21¼ to 22½
6959	5	Singapore (Lim.) .	5 0 0	3 10 0	
	5	Do., preference .	5 0 0	7 10 0	
		Shanghai			
4800	50	*Sth. Metropolitan*	50 0 0	10 0 0	70 to 71
15000	10	*Surrey Consumers*	10 0 0	9 0 0	12½ to 13
10000	10	Do., new	5 0 0	9 0 0	7 to 7¼
9000	4	United General . . (Limerick)	4 0 0		
10000	10	*Victoria Docks* . .	5 0 0	6 0 0	
3000	10	*Wandsworth & Putney*	10 0 0	7 10 0	13¼ to 14
20000	10	Western (L.) A sh.	10 0 0	10 0 0	13½ to 14
10000	10	Do., B shares.	5 0 0	10 0 0	6¾ to 7
10000	10	Do., C shares.	5 0 0	10 0 0	6¾ to 7
20000	10	Do., D shares.	1 0 0	10 0 0	1¼ to 2
8000	5	*West Ham*	5 0 0	7 10 0	6 10 0
6000	5	Do., new shares.	3 0 0	7 10 0	3 18 0
551	10	West London Junction (Lim.) . .	10 0 0	6 0 0	
520	10	Do., preference .	10 0 0	6 0 0	

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle	Wales.	Yorkshire, Derbyshire, and Staffordshire.
	£. s. d.	£. s. d.	£ s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1 (g.m.b.)	3 15 0	2 14 0	2 12 6	3 10 0	3 10 0
1¼ and 2-inch Socket-pipes	7 10 0	6 0 0	6 15 0	6 15 0	7 10 0
2½ and 3-inch ditto	7 0 0	6 0 0	6 5 0	6 10 0	7 0 0
4 and 5-inch ditto	6 10 0	5 10 0	5 15 0	6 0 0	6 10 0
6 inches and upwards ditto	6 5 0	5 0 0	5 10 0	5 15 0	6 5 0
Retorts, 1st fusion, hot blast	6 0 0	—	5 5 0	5 10 0	6 0 0
Ditto, 2nd ditto, cold ditto	7 0 0	5 15 0	6 0 0	7 0 0	7 0 0
Tank-plates, ¼ thick and above	6 10 0	5 10 0	5 10 0	5 15 0	6 5 0

WROUGHT-IRON TUBING,

Subject to 50 per cent. Discount.

	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 feet—per foot	1 8	1 0	0 10	0 7	0 5	0 4½
Ditto ditto, from 6 inches to 18 inches—each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting-pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows (wrought iron)	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, ditto	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Nipples	1 3	0 9	0 8	0 6	0 5	0 4
Fix in Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 3-quart	15 0	14 0	13 6	13 0	12 0	—

GAS COALS.—*Per Ton.*

Newcastle.—Unscreened:—

East Castle, Haswells, Nettlesworth Primrose, and South Pelaw	7s. 6d.
Felling, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	7 9
Burnhope, Craghead, Charlaw, Derwent, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	8 0
Peareth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	8 3
Brancepeth, Dean's Primrose, New Pelton, Pelton, South Peareth, Stella, Urpeth, Washington Hutton, and West Leverson	8 6
Ramsay's Newcastle Cannel	20 0
Wigan Cannel (at Liverpool)	17 0
Scotch Cannel:—	
Boghead (at Leith)	55 0
Kirkness, best (at Burntisland)	28 6
Capeldrae, 1st quality (at ditto)	28 6
Ditto, 2nd ditto (at ditto)	18 6
Cowdenbeath	12 0
Lesmahago (at Glasgow)	33 6
Ditto (at Granton)	30 0
Arniston	27 6
Wemyss	20 0
Haywood, Wilsontown (at Granton)	23 0
Firnie, or Methill	15 0
Lothian's Cannel (at Leith)	28 0
Myles' Cannel	23 6

FREIGHTS.

Coastwise—Newcastle.—Per Ton:—

Chatham and Rochester	5s. 9d to 6 0d
Cork	9s. to 9 6
Dover, Folkestne, & Ramsgate	8s. to 6 3
Dublin	9s. 6d. to 10 0
Exeter Quay	8 6
Ipswich	5 0
London (from Leith)	6 0
London (Pool)	6 0
Lowestoft and Yarmouth	4 6
Portsmouth & Southampton	7 0
Plymouth	7 9
Shoreham	6 9
Whitstable	5 9
Weymouth	7 6
Foreign.—Per Keel:—	
Barcelona	£19 10
Bordeaux	13 10
Boulogne and Calais	6 15
Cadiz	14 10
Cronstadt	9 0
Copenhagen	£8 to 8 5
Genoa	16 0
Hamburg	7 10
Havre de Grace	8 15
Leghorn	£16 to 16 10
Lisbon	14 0
Rotterdam	£7 to 7 6
Stettin	8 10
Trieste	17 0
Venice	19 10

SUNDRIES.

Best Nstle. Fire-bks., p. 1000, £2.10s. to £2	13 0
Cliff's Fire-bks. (at Wortley), p. 1000.	2 15 0
Ingham's ditto (at Wortley), p. 1000.	2 13 0
Fire-clay Retorts, p. ft. run, 5s. 6d. to	0 7 0
Tough Cake Copper, p. ton	81 0 0
English Pig Lead, p. ton	19 12 0
Welsh Bar Iron (in London), p. ton	6 10 0
Foreign Spelter, p. ton	20 12 6
English Block Tin, p. ton	91 0 0
Banca, p. ton	93 0 0
Tarred Rope Yarn, p. cwt.	1 0 0

is used. Our reservoir is about a mile and a half from the New River, at the Tottenham reservoir. There it is 70 to 80 feet, about the level of our reservoir. There is no objection to our drawing water from the New River, except that the water can hardly be got there. It does not exist in the upper levels of the river in sufficient quantities for the New River to be able to divert it. The New River Company could draw more than they use, but not enough to supply the two companies, because at times we have had enough to do to find the water where we are receiving two tributaries, and a large portion of the main river beyond what flows past their source at Hertford. The river has a very fair supply at Hertford. Their fullest right to draw is 22,500,000 gallons daily or 2500 feet a minute. I believe they have not yet drawn that quantity. They have told us that they draw 18,000,000 gallons. We do not spy upon what they are doing. The machine is so made that they cannot draw more than the 2500 feet.

The CHAIRMAN: If you took the water in dry weather from above Chingford Mill, there would not be enough left to supply the mill with water?

Witness: It is a breast-wheel—all the wheels on the Lea are breast-wheels. I believe there are no over-shot wheels; they are under-shot wheels. If we took all we could we should seriously interfere with the power of the mill.

The CHAIRMAN: But would you have enough if you took it only at flood water.

Witness: No, we shall not be able to fill up our reservoirs, we should not pursue our necessities or advantages to the extent we ought to.

Mr. HENRY BAILLIE: Provided that the water was purified up to the source of the Lea and its tributaries, do you consider that you would be able to draw a sufficient quantity for any increased supply which might be demanded?

Witness: That is a most serious view to entertain on M. Bazalgette's plan. I fear that this plan will divert a large quantity of water with such a very extensive system of drainage. As you press the question of quality, so you endanger the question of quantity.

The CHAIRMAN: If the whole of the flood-water were gathered into the reservoir, would that fill the reservoir which you propose, or even a much larger one?

Witness: I think that the whole of the flood waters, if we could contrive to catch them all, would certainly fill a larger reservoir than I am proposing now. The quantity of water flowing down the Lea in a flood runs up to 30,000 and 40,000 feet a minute in flood times.

Mr. KEKEWICH: Is the Lea River, a river which rises very quickly on account of its many tributary systems?

Witness: The upper tributaries do not flood very rapidly. It is not until the junction of the six tributaries that it floods very rapidly; but from there, downwards, on the marshes it floods very rapidly. It is not a sluggish river; it has a good fall.

The CHAIRMAN: Do I understand you that if the intercepting drains were made on Mr. Bazalgette's scheme, the quantity of water intercepted from the river would be so great that you would not be able to obtain water?

Witness: I could hardly say that. It would depend upon the perfectness with which they were made. Drains made through a valley very often carry away more water than is desired, on account of the porosity of the bottom of the sewers; but if they are very carefully made, so as not to carry more than the pipe sewage, then the interception would not be very great.

The CHAIRMAN: You think the water would be sufficient for your purposes after the drain was made?

Witness: It would be admirable water. It would take off a quantity of water certainly, but how much I cannot possibly say, because it would depend upon the expense which they put into the drain, and the excellence of the work.

Colonel HOGG: The main drainage works have virtually interfered with the supply of water, have they not, and have made many pumps and wells dry in London?

Witness: I have heard that they have.

The CHAIRMAN: What plan do you ultimately propose to improve the supply of water from the Lea below the New River cut?

Witness: We must hold our hands in abeyance until we see the upshot of the Rivers Commission, and the joint parishes below, who called in Mr. Bazalgette. We hold ourselves ready to contribute in some way, but in what way it is impossible at present to say.

(*To be continued.*)

PRESENTATION TO HENRY STEEL, ESQ., LIVERPOOL.—Mr. Henry Steel, for many years manager and treasurer to the Liverpool Gas Company, has just retired from his position, and the event has been made the occasion of a pleasant expression of good feeling towards him on the part of his colleagues in the service. The following address, signed by 156 of the *employés* in the gas office and works, has been presented to Mr. Steel:—

TO HENRY STEEL, ESQUIRE.

We, the undersigned, upon your retirement from the position of treasurer and manager to the Liverpool United Gaslight Company, after a career of forty-three years, and in remembrance of your ability, courtesy, and high moral character, request you will honour us by accepting this address as a record of the admiration and esteem in which you are held, and hope that you may long continue in the enjoyment of prosperity, peace, and happiness.—On behalf of the subscribers, we remain, dear sir, yours respectfully,

WILLIAM KING,
JOHN WRIGHT,
SAMUEL HAYNES.

The address is enclosed in a very beautiful and costly casket, which has been manufactured expressly for the purpose by Messrs. Elkington and Co., of Church Street, and is now on view in the window of that establishment. The casket is made of ebony, relieved with richly silver-gilt mouldings, artistically pierced and engraved. On the centre of the cover or lid is a delicately chased scroll surrounding a shield, which bears the following inscription:—"Presented to Henry Steel, Esquire, upon his retirement from the Liverpool United Gaslight Company. March 31, 1867." The state of Mr. Steel's health prevented his friends from making any public demonstration upon the occasion of presenting the address, but Mr. Steel has sent the following letter to Messrs. W. King and others:—

Dear Sir,—Severe and continued indisposition has alone prevented me from acknowledging the address presented in a manner so flattering to myself by so many of my old companions in the office of the gas company. Such honest expressions of esteem and goodwill, coupled as they are with such warm and kind wishes for the future, could not but deeply touch me. I must crave your indulgence if I am compelled to delay thanking you personally until it may please God to give me strength to do so in a suitable manner. In the meantime, pray accept for yourselves and convey to the subscribers my assurance of the high sense of gratitude and pleasure with which I have received their address, contained as it was in a casket designed with such exquisite taste and skill.—I am, very faithfully yours,

Messrs. King and others. HENRY STEEL.

Advertisements.

GAS EXPLOSIONS PREVENTED

BY THE USE OF

JOHN RUSSELL & CO.'S TUBES & FITTINGS.

Gas Explosions are of frequent occurrence, but we do not hear of them unless death has resulted. As in the case at Clerkenwell lately, gas explosions may generally be traced to the use of Tubes of defective workmanship and inferior iron. Adopt the Tubes and Fittings of John Russell and Co., which are all of the best quality.

JOHN RUSSELL & CO.

ARE THE

INVENTORS OF THE LAP-WELDED TUBE FOR LOCOMOTIVE & MARINE BOILERS,

AND THE OLDEST MANUFACTURERS OF TUBES FOR GAS, STEAM, & WATER.

WAREHOUSES:

69, Upper Thames Street, E.C.; Commercial Street, N.E.; & Charles Street, Soho Square, London; Also at 35, 36, 37, and 39, Granby Row, Manchester.

MANUFACTORIES:

The Old Tube Works, Wednesbury, and the Alma Works, Walsall, Staffordshire.

Address to 69, UPPER THAMES STREET, LONDON, E.C.

WILLIAM & BENJAMIN COWAN,

(ESTABLISHED 1827,)

WET AND DRY

GAS-METER MANUFACTURERS,

BUCCLEUCH STREET WORKS, EDINBURGH.

TO FOREMEN OF GAS-WORKS.

WANTED, at a large Metropolitan Work, a well qualified FOREMAN to take the entire charge of the gas manufacture for twelve hour a day.

Applications, stating age and present occupation, to be sent to G. C. T., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a young Man, aged 23, a Situation as Meter Prover or Out-door Inspector. Has had two years experience in a public meter office. Satisfactory references can be given.

Address J. A. F., 151, Albany Road, CAMBERWELL, S.

PHŒNIX GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that, at the HALF-YEARLY GENERAL MEETING of the said Company, held at this Office, on WEDNESDAY, the 3rd inst., a CALL of TEN POUNDS per centum on the New Stock (making £35 per cent. paid) was made upon the several Subscribers and Proprietors of the said undertaking, according to their registered amount of Stock, and that such Call is to be paid to the account of the Treasurer at the Bank of Barclay, Bevan, Tritton, Twells, & Co., of 54, Lombard Street, London, E.C., on or before the 1st of August next.

CHARLES PRIDDEN, Secretary.

70, Bankside, London, S.E., July 4, 1867.

TO GAS COMPANIES AND ENGINEERS.

FOR SALE.—A Good Cast-Iron Tank, in excellent condition, 45 feet diameter, 14 feet deep, either with or without Gasholder.

Also the following STATION-METERS:—

One to pass 12,000 cubic feet per hour.
One " 8,000 " "
One " 4,000 " "
Two " 3,000 " "

The whole have been taken apart, thoroughly examined, and are in good working order, equal to new.

The above have been taken down to make room for larger.

Apply to JOHN VICKARY, Gas Engineering Works, EXETER.

PIRNIE OR METHILL CANNEL.

ONE of the best Gas Producing Cannels for bringing up the quality of ordinary coal gas. See Dr. Frankland's Lecture, reported in the JOURNAL OF GAS LIGHTING, 30th of April last.

For price apply to PIRNIE COAL COMPANY, Leven, FIFE.

TAR & AMMONIACAL LIQUOR FOR SALE.

THE Directors of the Blackburn Gas-light Company are prepared to receive TENDERS for the purchase of all the TAR and AMMONIACAL LIQUOR to be produced at their works between the 1st of January, 1868, and the 30th of June, 1869.

Printed conditions and other information may be obtained from Mr. O. BROTHERS, the Company's Engineer, by whom tenders in writing will be received until the 1st of August next.

Gas-Works, Blackburn, June, 1867.

AUCHINHEATH, Lesmahago, Gas COAL, known in the market for the last fifty years as a first-class gas coal.

JAMES FERGUSON and CO.,

Sole Lessees of the Auchinheath Coal-Field, are prepared to ship the above at Glasgow, Greenock, and Ardrossan, on the west coast of Scotland; and at Granton or Leith, in the Firth of Forth, on the east coast. Also to forward them to any railway-station in Scotland or England.

Price and other particulars may be learned by addressing

JAMES FERGUSON and CO.,
GAS COAL WORKS,
LESMAHAGO.

GAS OF HIGH ILLUMINATING POWER.

THE Trinidad Petroleum Company, Limited, will supply samples of their Trinidad PITCH for gas purposes of 1 lb. each free of charge, or samples of 1 ton or upwards at 45s. per ton, delivered on to the railway at Silvertown, on application being made to their SECRETARY, at the Offices of the Company, 110, CANNON STREET, E.C.

WANTED, a good Stoker for a country Gas-Work. Constant employment.

Address A. B., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS TAR & AMMONIACAL LIQUOR FOR SALE.

THE Directors of the Dudley Gas Company invite TENDERS for the surplus TAR and AMMONIACAL LIQUOR to be produced at their works for one year, ending June 30, 1868.

The quantity of Tar will be about 40,000 gallons, and Liquor 150,000 gallons.

Tenders to be sent in not later than the 23rd inst.

The Directors do not bind themselves to accept the highest or any tender.

Gas-Works, Dudley, July 3, 1867.

BALANCE-SHEETS AND REVENUE ACCOUNTS.

A FIRM of Accountants, much engaged in the preparation of Gas Companies Accounts, are open to contract for the keeping, balancing, or auditing the books of other Companies, which, from their experience, they are enabled to do on moderate terms.

Address, SANDELL & MADDERS, Accountants, 4, Skinner's Place, Size Lane, LONDON, E.C.

STEARS BROTHERS & CO.,
Gas Engineers and Contractors,
3, GEORGE STREET, HULL,
AND
73, COLEMAN STREET, LONDON, E.C.

Contractors for Gas-Works of any size at home or abroad. Copy of testimonials from numerous Gas Companies can be had on application.

WOLVERHAMPTON RETORT WORKS.
ESTABLISHED 1840.
JOHN EUNSON AND SON,
GAS ENGINEERS, AND MANUFACTURERS OF CLAY RETORTS,
AND FIRE GOODS IN GENERAL,
WOLVERHAMPTON.
Retort Mouthpieces, Bolts, Nuts, and every description of Wrought-Iron Work.

JOHN VICKARY,

GAS ENGINEER AND CONTRACTOR, IRON AND BRASS FOUNDER,

WORKS—EXE ISLAND, EXETER,

Tenders his best thanks to the various Gas Companies in **England, Ireland, and Wales,** for the very liberal and kind support he has received for the last **22 years,** during which period he has erected and extended above **200 Gas-Works.**

In addition to the numerous towns wherein he has been engaged, he begs reference to the following testimonial:—

Plymouth and Stonehouse Gaslight and Coke Company.

Sir,—I have much pleasure in testifying that the 100-foot Telescope Gasholder and Cast-Iron Tank, erected by you for this Company in 1862, has given the highest satisfaction, and never required the slightest attention or adjustment since its completion.

(Signed) PETER ADAMS, Chairman.

He has also erected a 100-foot Gasholder and Cast-Iron Tank at **Exeter;** an 80-foot Telescope Gasholder and Iron Tank at **Devonport;** a 90-foot at **Torquay,** &c. &c. At either of those works satisfactory references can be made.

He also begs particular attention to his **Improved Gas-Meters,** either **Wet, Dry, or Compensating,** the materials and workmanship of which guaranteed of the very best description, and which has gained for his Meters so excellent a reputation for these last **20 years.**

RETORTS, DIP & ASCENSION PIPES, HYDRAULIC MAIN, CONDENSERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, and GASHOLDERS,

Of any size, and every description of article required in Gas-Works.

Mains, Tees, Connexions, and Syphons, from 2 to 12 in., always in stock, and supplied at Scotch prices.

Clay Retorts and Fire-Goods of every description.

Gas-Fittings of the most modern designs.

Iron Pipe and Fittings, Service Cocks, &c.

Plans, Specifications, and Estimate for the erection of New Gas-Works of any size furnished.

LEAKAGE REDUCED

BY THE USE OF

CATHELS'S PATENT

DRY DISTRICT GOVERNOR.

Gas Companies supplying districts with varying levels can, by the use of this Governor (which is entirely new in principle), assimilate the pressures in the higher to that in the lower levels, and so materially reduce their leakage accounts. It is self-acting, simple, and certain, *increasing and reducing the pressure as required.*

Prices and particulars furnished on application to

MESSRS. GUEST & CHRIMES, FOUNDRY & GENERAL BRASS-WORKS, ROTHERHAM.

CALLEY'S
TORBAY IRON OXIDE PAINTS
Are Durable, Economical, and keep their Colour.

See "The Record of Engineering," 1864.
"The Journal of the Society of Arts," June 1, 1866.
"The Mechanics' Magazine," October 26, 1866.
"The Engineer," November 2, 1866.
"The Building News," November 9, 1866, &c.

WORKS: IRON ROAD, BRIXHAM, TORBAY.
LONDON OFFICE:
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TO ARCHITECTS, CIVIL ENGINEERS, BUILDERS, &c.

THE NEWEST DESIGNS FOR
LAMP-POSTS, DWARF GAS PILLARS,
BRACKETS, LAMPS,
GARDEN & DRINKING FOUNTAINS,
GATES, RAILINGS, VERANDAHS,
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Will, upon receipt of particulars, be forwarded by
TURNER & ALLEN,
Ironfounders, Engineers, &c.,
201, UPPER THAMES STREET, LONDON, E.C.
Contractors for the supply of Lamp Columns, Lamps, &c., to Railway and Gas Companies, Local Boards, &c.
PIPES, TUBES, & FITTINGS FOR GAS, STEAM, & WATER.

MATHER AND PLATT,
SALFORD IRON-WORKS, MANCHESTER,

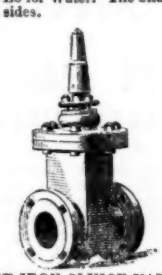
Beg to call attention to their Revised List of Prices of VALVES, TAPS, &c. They also request the notice of Water Companies and Hydraulic Engineers to their IMPROVED SLUICE-VALVES for Water. The Slides have Gun-Metal Facings, are of wedge form, and when screwed down are tight on both sides.

GUN-METAL TAPS.

Bore.	Price.
¼ inch	£0 4 0
⅜ ,,	0 4 6
½ ,,	0 6 0
1 ,,	0 8 6
1¼ ,,	0 11 0
1½ ,,	0 14 0
1¾ ,,	0 18 0
2 ,,	1 2 6

CAST-IRON STEAM-VALVES.
With Gun-Metal Valves & Seatings.

Bore.	Price.
2 inches	£1 2 6
3 ,,	1 17 6
4 ,,	2 15 0
5 ,,	3 15 0
6 ,,	4 17 0
7 ,,	6 0 0
8 ,,	7 5 0
9 ,,	8 15 0
10 ,,	10 10 0
11 ,,	12 5 0
12 ,,	14 0 0

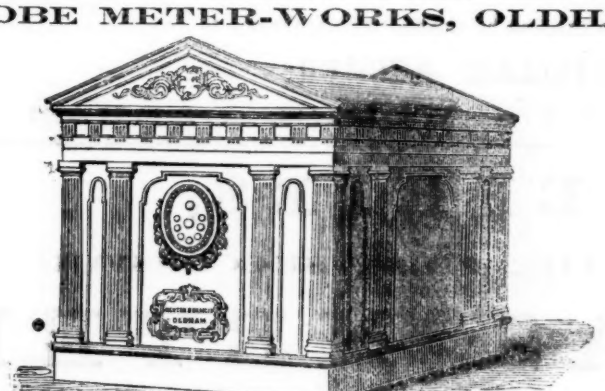


CAST-IRON SLUICE-VALVES.
With Gun-Metal Facings.

Bore.	Price.
2 inches	£1 10 0
3 ,,	2 5 0
4 ,,	3 0 0
5 ,,	3 16 0
6 ,,	4 14 0
7 ,,	5 14 0
8 ,,	6 16 0
9 ,,	8 0 0
10 ,,	9 6 0
11 ,,	10 14 0
12 ,,	12 4 0

Prices and particulars of all other forms and sizes can be had on application.

GLOBE METER-WORKS, OLDHAM.



NEWTON & BRADDOCK,
MANUFACTURERS OF
STATION METERS, CONSUMERS METERS, &c.

N.B.—The EDGES of the PLATES for Square Station Meters are PLANED so as to insure perfect joints—guaranteed not to leak.

PARIS EXHIBITION, Group 6, Class 53, No. 31.

EIGHTEEN YEARS PRACTICAL EXPERIENCE.

EDWIN BENTLEY,
RETORT SETTER,
29, LOWER HOPE STREET, HALIFAX,
YORKSHIRE.

Fire-Clay and Iron Retorts, Double and Single Grooved Brick Retorts, of every description.
Bentley's Improved D Brick Segment Retorts, 5 or 3 in one bed.
Testimonials and references on application.

By Her Majesty's Royal Letters Patent.

JAMES HISLOP'S
IMPROVEMENTS IN APPARATUS
FOR
SCURFING RETORTS.

All Engineers and Managers of Gas-Works will admit the importance of securing ready means for the removal of Carbon without endangering the Retort. The Patentee, therefore, feels great confidence in introducing a system by which the Carbon is consumed with rapidity, and without resorting to the destructive use of chisels, which has hitherto been relied on to effect its removal. To those who now experience difficulty in Scurfing their Retorts, the adoption of the improved method would be a great relief, while it would materially add to the durability of the Retorts.
The Patentee will be glad to receive applications for the use of his improvements, and will be happy to supply further information on communicating with JAMES HISLOP, Gas-Works, AYR, N.B.

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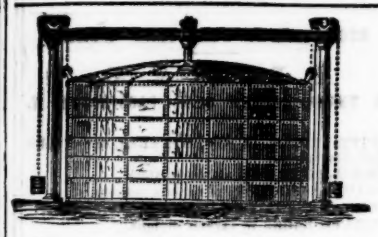

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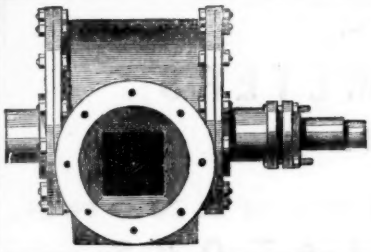

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